

NETWORK WORLD

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T-1 network keeps watch over itself

By Paul Desmond
Senior Editor

BENTON HARBOR, Mich. — Whirlpool Corp. is in the final stages of cutting over a T-1 network that expands available bandwidth by four times without increasing line costs and offers greater net management capabilities.

The eight-node network, which is replacing 9.6K and 19.2K bit/sec analog and 56K bit/sec digital leased lines, is based on Network Equipment Technologies, Inc. (NET) IDNX multiplexers and uses NET's Expert Fault Management Service (EFMS).

Without manual intervention, EFMS can determine the root of many network outages and automatically transmit trouble tickets to an NET-staffed technical assistance center.

Mark Deckert, senior telecommunications analyst at Whirlpool, based here, said his company is currently cutting over the last of its data and video applications to the T-1 net, which it began building just last month. The last of the applications should be cut over by Jan. 15.

The backbone comprises one NET IDNX/70 and seven IDNX/ (continued on page 6)

Top issues facing IS management

	1991	1990	1989	1988
Reshaping business process through information technology	1	1	11	NR
Aligning IS and corporate goals	2	4	2	1
Instituting cross-functional systems	3	3	7	NR
Boosting software development productivity	4	6	13	12
Utilizing data	5	7	6	7
Developing an IS strategic plan	6	5	4	2
Improving quality of software development	7	14	NR	NR
Creating an information architecture	8	9	5	5
Integrating IS	9	16	12	6
Improving IS leadership skills	10	NR	NR	NR
Cutting IS costs	11	10	14	17
Using IS for competitive breakthroughs	12	8	1	4
Improving IS human resources	13	11	8	8
Educating management about IS	14	2	3	3
Connecting to customers and suppliers	15	19	NR	NR

Figures are based on a survey of 394 senior IS executives in large North American corporations.

IS = Information systems
NR = Not ranked that year

See story, page 2.

SOURCE: INDEX GROUP, INC., CAMBRIDGE, MASS.
GRAPHIC BY SUSAN J. CHAMPENY

Users sing the praises of predictive dialing systems

By Wayne Eckerson
Senior Editor

A network technology that can triple worker productivity, provide a hefty return on investment, pay for itself in less than a year and offer a significant competitive advantage seems like a network manager's pipe dream.

Although many users are unaware of it, such a technology exists today. It's called predictive

dialing, and it's being used by a small but growing number of companies for applications ranging from telemarketing and fundraising to increasing collections on overdue loans, credit payments and taxes.

A predictive dialing system is a specialized digital switch that automatically dials phone numbers contained in a host data (continued on page 6)

Mux mart newcomer airs low-end T-3 box

T3plus Networking to unveil entry-level multiplexers that offer great flexibility in bandwidth allocation.

By Paul Desmond
Senior Editor

SANTA CLARA, Calif. — T3plus Networking, Inc. this week will announce a line of entry-level T-3 multiplexers that give users the flexibility to support channels of any bandwidth between T-1 and T-3.

The new BMX45 T3 Bandwidth Managers support one or two fully redundant T-3s on the trunk side and as many as 56 T-1s or 28 high-speed data inputs. The devices, which are expected to ship in March, will support only point-to-point configurations, but a software upgrade due out in June will provide support for drop-and-insert and ring topologies.

Analysts said the new multiplexers are competitively priced with offerings from vendors such as Infotron Systems Corp., Network Equipment Technologies, Inc. (NET) and NET subsidiary Adaptive Corp. Also, the BMX45's flexibility in bandwidth allocation separates it from products such as Timeplex, Inc.'s TX3/SuperHub, which supports only T-1 channels.

"This is the kind of product that the market is ready for right

now," said Rick Malone, a principal at Vertical Systems Group, a consultancy in Dedham, Mass.

Malone said users that need T-3 today typically require only one or two T-3 pipes. Offerings from vendors such as Adaptive, (continued on page 7)

Making Macs work with PCs



See story, page 36.

N.Y. rocked by big AT&T fiber outage

By Barton Crockett
Senior Editor

NEW YORK — AT&T last Friday suffered a major cable cut that knocked out long-distance traffic and private networks in the New York metropolitan region and New Jersey.

The cut in a 1.8G bit/sec fiber cable carrying traffic into and out of New York halted operations at commodities and futures exchanges and interrupted service on a vital air traffic control network. As a result, officials were forced to stop all incoming and outgoing flights at three major airports serving the city.

The cable cut also knocked out service to 23 of the 80 banks on the New York Cash Exchange (NYCE) automated teller network, according to NYCE marketing manager Liz Taylor.

Service was restored to some of the affected banks within about (continued on page 54)

NETLINE



TRW SAYS AT&T'S Rhapsody groupware will pay for itself in six months. Page 2.

INTERNET MAY PASS UP its own TCP/IP and OSI routing protocol for OSPF. Page 2.

A COMMERCE DEPT. STUDY predicts transmission service revenue will fall, while NATA research paints a rosy picture for equipment markets. Page 4.

EXTENDING VIRTUAL NETS to workers' homes benefits employees and builds corporate volume discounts. Page 4.

VIDEO PIONEERS ready links to suppliers, customers and strategic partners. Page 4.

DRUG STORE RETAILER uses Chapter 11 to free up funds needed to build a critical packet network. Page 6.

FEATURE



Getting from Ethernet to token ring by bridge

By Salvatore Salamone
Features Writer

Users have been buying and installing Ethernets for 15 years or more and token rings for roughly half a decade. As a result, there are now thousands of Ethernets and token-ring LANs installed in the U.S.

You might assume, therefore, that there are a variety of convenient, cost-effective ways to send data between these two

types of local-area networks.

Wrong. Very wrong. Only a few methods exist for transmitting data between Ethernet and token-ring nets.

The most popular method are gateways, often based on minicomputers or mainframes, which have been around for years.

More recently, the much desired Ethernet-to-token-ring conversion feature has been (continued on page 39)



Study: Top IS execs to align technology, business tasks

Despite lean budgets for 1991, many plan to invest heavily in technology to improve service.

By Bob Brown
Senior Editor

CAMBRIDGE, Mass. — A new study says top information systems (IS) executives have resolved to marry network technology and IS with common business tasks this year to provide better service to customers.

Although IS managers said budgets will be tight in 1991, about half of those surveyed by Index Group, Inc., a consultancy here, said they plan to make major technology investments to improve customer service.

Users are targeting such technologies as electronic data interchange, local-area networks, data base management systems

and imaging technologies to improve order processing, postsale customer service and product delivery functions.

The need to align technology with business tasks "underscores just how easily an IS organization can stray from the corporate mission, given the ever-rapid changes in markets, customers, technology and competitors," the study said.

Index Group interviewed senior IS executives at 394 major corporations in North America for its "Fourth Annual Survey of I/S Management Issues." Index Group is a business unit of Computer Sciences Corp., an El Se-
(continued on page 54)

TRW implements Rhapsody to streamline purchasing

Electronics firm expects to reap big savings.

By Wayne Eckerson
Senior Editor

REDONDO BEACH, Calif. — One of the first companies to purchase AT&T's Rhapsody Business Orchestration Solution says the LAN-based groupware will pay for itself within six months and will ultimately yield hundreds of thousands of dollars in savings.

TRW Electronic Systems Group, a major defense contractor and manufacturer of satellites, last week began implementing Rhapsody in its 108-member purchasing department here.

AT&T Computer Systems began shipping Rhapsody at the end of October but declined to dis-

close the number of companies that have purchased the product to date.

Rhapsody will enable TRW to streamline its purchasing process by eliminating many of the repetitive tasks involved in assembling paper-based purchase orders, said Fred Leland, procurement manager with the Electronic Systems Group here. Purchase orders for large defense projects can each stack as high as two feet and consume thousands of sheets of paper, he said.

Rhapsody is expected to reduce from 100 days to 50 the time it takes to prepare purchase
(continued on page 55)

New IS-IS routing protocol faces tough competition

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — The Internet Engineering Task Force (IETF) recently released a new standard for a dual-use routing protocol for TCP/IP and OSI networks, but it faces competition from another TCP/IP standard, Open Shortest Path First (OSPF).

The IETF dual-use Integrated Intermediate System to Intermediate System (IS-IS) uses one routing protocol to support both Transmission Control Protocol/Internet Protocol and Opens Systems Interconnection networks.

But at its next meeting on March 11, the IETF may decide to

pass over the protocol and recommend OSPF as the routing protocol for the Internet.

Vinton Cerf, chairman of the Internet Advisory Board, said the IETF, which is the informal standards body for Internet, will take up the question of the protocols at the next IETF meeting, which is expected to be attended by 350 users, vendors and researchers.

Cerf said it is possible the IETF will select one standard over the other only to have the Internet community decide it does not have enough experience with or information about the protocols to make a recommendation.
(continued on page 54)

Briefs

AT&T sues NCR. AT&T last week filed suit against NCR Corp. in a U.S. District Court to force the Dayton, Ohio, computer company, which has rejected AT&T's \$6.12 billion takeover offer, to remove its poison pill and other anti-takeover measures that would increase AT&T's acquisition costs.

In the suit, AT&T charged NCR's board with failing to carry out its fiduciary duties to its shareholders. AT&T's current offer of \$90 per share of NCR stock is scheduled to expire on Jan. 15. NCR called the AT&T charges "frivolous."

Top net exec announces retirement. DuWayne Peterson, who has guided Merrill Lynch & Company, Inc.'s computer and network operations since 1986 and helped usher in the era of outsourcing, said last week he plans to retire this June.

During his tenure with Merrill Lynch, Peterson made sweeping changes to the company's data network operations by consolidating data sites and upgrading branch office computer systems. Merrill Lynch said Peterson will be succeeded as executive vice-president of operations by Edward Goldberg, a company veteran who currently is running the firm's trade-processing and wholesale operations.

Air France builds packet net. Air France last week said it is building a private X.25 packet-switched network based on Northern Telecom, Inc. DPN-100 switches to link its main reservations center in Valbonne, France, with offices in Paris and at least 20 other locations across France, and along the Caribbean and Indian Ocean.

The airline has already installed DPN-100 nodes at Orly and Charles de Gaulle airports in Paris and at its top maintenance facility in Toulouse, France. The construction of the network is part of an ongoing global net modernization program.

DG cans Asparagus project. Financially strapped Data General Corp. has quietly dropped a high-profile project to supply Japan's Nippon Telegraph & Telephone Corp. with data communications equipment to be used in private voice and data networks.

Under the project, dubbed Asparagus, DG promised to build hybrid exchange systems that integrate data, voice and computer capabilities for intelligent

private corporate networks. A DG spokesman last week said both companies agreed to terminate the project after an assessment of the Japanese market turned up little demand for the products.

FCC assures air phone competition.

The Federal Communications Commission last week granted licenses to four companies to provide nationwide air-to-ground phone service. The FCC action sets the stage for the first competition in the market; until now, GTE Corp.'s Airfone, Inc. had been the sole provider of service. It will be joined by In-Flight Phone Corp. (IFPC), Clairtel Communications Group L.P., Mobile Telecommunications Technologies Corp. and American Skycell Corp. IFPC is headed by John Goeken, who founded Airfone in 1984 and later sold the operations to GTE.

Goeken was also a founder of MCI Communications Corp.

IBM promises to upgrade Pacific hub.

IBM late last month announced plans to more than double the capacity of a net hub in Australia used to provide local and global data communications services. The hub will be used to support regional communications to other IBM hubs in the Pacific, including sites in Singapore, Hong Kong, Malaysia, Indonesia, Thailand and the Philippines.

Codex to launch new V.32 line.

Codex Corp. this week is expected to announce a new line of V.32 dial-up modems that will provide greater functionality at a lower cost than the company's older Model 2260 modems. Unlike the 2260s, the new 326X Series modems will support the CCITT V.32bis standard for 14.4K bit/sec data transmission as well as the CCITT V.42bis standard for error correction and data compression. They can also be managed by Codex net management systems.

Larry Cynar, senior industry analyst at Dataquest, Inc., a consultancy in San Jose, Calif., said Codex will offer four models. The Models 3262 and 3265 are the U.S. and international stand-alone versions, respectively. The Models 3262 and 3267 are U.S. and international double-density rack-mountable modem cards. Prices range from \$1,195 for the stand-alone version to \$2,195 for a rack-mountable card with two modems.

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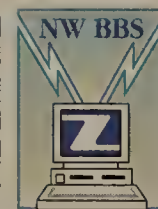
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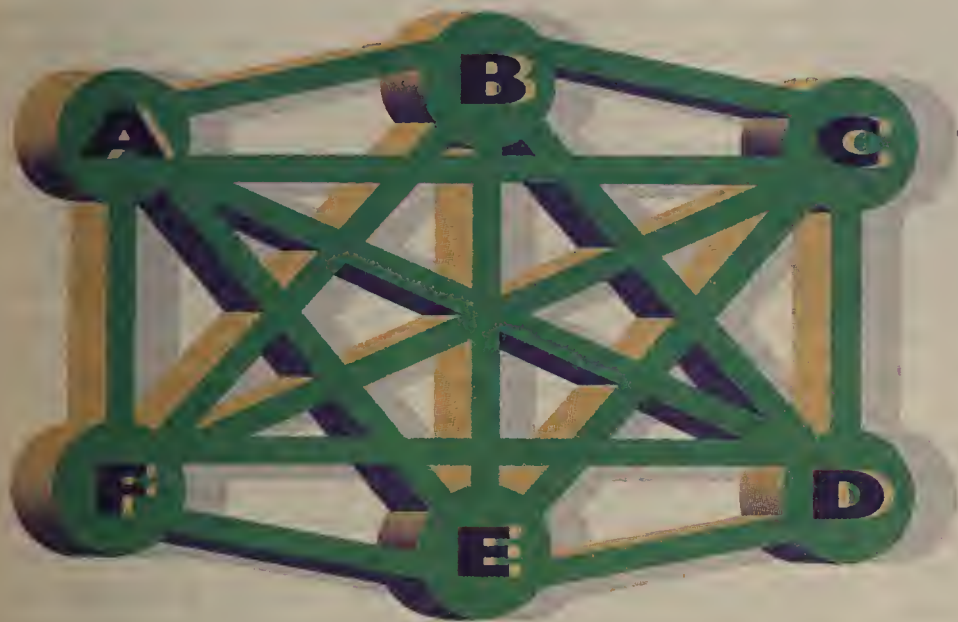
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UP TILL NOW, the conventional way to build a LAN internetwork was to use private lines. And to connect each LAN to every other LAN or host. The management issues were

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IT'S A NEW WORLDSM

Users extend virtual nets to include worker homes

Strategy streamlines the process of reimbursing employees for calls, leads to volume discounts.

By Bob Wallace
Senior Editor

In an effort to further extend virtual network functionality to workers while cutting communications costs, large companies are expanding their virtual networks to employees' homes.

Besides extending employee work days, giving users access to the company network generates traffic that may enable firms to qualify for larger volume discounts.

Switched access to the company's virtual network gives employees basic features, including seven- and 10-digit on-network calling, call routing, international calling and 9.6K bit/sec data transmission.

"We began providing [AT&T Software-Defined Network service] to the home some time ago because our employees, especially top executives, wanted to work from home without running up a big telephone bill," said Tom O'Toole, communications system director for Westinghouse

Electric Corp.'s Westinghouse Communications net services unit.

Streamlining

Providing SDN to the home streamlines the cumbersome process of reimbursing employees for business calls made from home, O'Toole said. Westinghouse has realized substantial savings by bringing homes aboard its virtual net because SDN calls are less expensive than direct-dial long-distance calls.

AT&T SDN Product Manager Glenn Starr estimates that about one-third of the carrier's 900 SDN customers are either considering offering SDN to the home or are already doing so.

Although this is largely done today to support executives and other high-level employees, Starr said large users are looking at offering SDN to the home as part of their employee benefits program — an added perk for employees and a traffic volume builder for their employers.

Many users, such as Steelcase, Inc., a \$1.8 billion office furniture manufacturer in Grand Rapids, Mich., are examining the trade-offs of tying key workers' homes to its SDN, known as CaseNet.

"I welcome the idea of extending virtual nets to employees' homes," said John Crankshaw, telecommunications manager for Steelcase. "It would certainly be a great way for us to build volume and reach the next SDN discount level, which means greater savings."

The furniture manufacturer is in the process of adding 550 of its dealers, eight design firms and 500 overseas sites to CaseNet, which already supports more than two dozen Steelcase dedicated access sites.

"Employees would get the Steelcase discount, and we would get the volume to increase our discounts," Crankshaw said.

AT&T and MCI Communications Corp. charge a nominal onetime setup charge for location-level billing. AT&T will individually bill as many as 6,000 locations as part of its SDN service.

Allan Palmer, Vnet product manager for MCI, said the carrier may provide per-site setup charges for location-level billing to keep resellers and aggregators

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Videoconferencing users seek intercompany links

Users cut costs, strengthen client relationships.

By Bob Brown
Senior Editor

Users that pioneered videoconferencing by linking intra-company business units are beginning to use the networks to link up with suppliers, customers and strategic business partners.

Early practitioners of intercompany videoconferencing said the technology saves them time and money by replacing business trips, allows them to coordinate and schedule meetings with key attendees on shorter notice, enables more people to participate in meetings and generally strengthens relationships with customers and suppliers by keeping them in close contact.

Analysts said intercompany videoconferencing is catching on because system sales have reached critical mass and users have become comfortable with the technology. Analysts predict that by 1995, many users may be using videoconferencing more on an intercompany basis than they do internally.

"As we reach critical mass in the industry, we're starting to see a number of companies [using videoconferencing to talk] to companies with which they do business on a regular basis," said John Tyson, president and chief executive officer of videoconferencing equipment maker Compression Labs, Inc. (CLI).

Intercompany videoconferencing promises to grow further in coming months as vendors roll out standards-based videoconferencing gear that will let different systems work together. Currently, users must employ the same brand of equipment or a gateway service to communicate between different vendors' gear.

The advent of high-speed switched digital services, which can be used on demand, also promises to boost the level of intercompany videoconferencing traffic.

Some companies, such as Bechtel Group, Inc., are starting to use videoconferencing as a tool to provide service and support to customers, said Roger Redmond, vice-president at the investment firm of Piper, Jaffray & Hopwood, Inc. in Minneapolis.

"The big advantage of intercompany videoconferencing is leveraging your customer contacts," he said. "You'll be able to increase the frequency and effec-

tiveness of your interaction with customers."

Redmond projected that five to 10 years from now, intercompany videoconferencing will account for as much as 80% of all video traffic at many large firms.

Cher Diller, senior telecommunications specialist at McDonnell Douglas Aerospace Information Services Co. in St. Louis, said almost 20% of the company's videoconferencing is already conducted with other companies.

"Off-net videoconferencing has grown tremendously here in the last five months as our comfort level with videoconferencing has grown," Diller said.

McDonnell Douglas is particularly active in using videoconferencing to communicate with other aerospace firms, which often bid on large government contracts together, as well as with government customers.

"Using videoconferencing with our teaming partners helps speed decision making," said Diller, whose company has more than 30 offices equipped with PictureTel gear and is operating nine full-function videoconferencing rooms with equipment from CLI. "Rather than just flying one or two people to a meeting, videoconferencing allows participation from all of the people needed at a meeting."

And because videoconferences often need to be scheduled for reserved blocks of time when users employ a gateway service such as The Meeting Channel from US Sprint Communications Co., "meeting participants tend to be more aware of time and get to the business at hand," said John Lacombe, head of telecommunications at Hughes Aircraft Co. in El Segundo, Calif.

Intercompany videoconferencing has become so important to Bechtel, a San Francisco-based engineering construction firm, that it has actually started writing into its bids that potential customers install videoconferencing equipment to allow for better customer/supplier communications.

"We explain to the customer how videoconferencing can be cost-justified," said Eric Murphy, telecommunications analyst at Bechtel, which has installed 10 videoconferencing systems from PictureTel and began intercom-

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Studies point to telecom outlook in '90s

Commerce Dept. forecasts decline in domestic and international telecom service revenues in '91.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — Despite record levels of telecommunications traffic last year, the U.S. Department of Commerce last week said it expects 1991 revenue growth for both international and domestic services to fall for the first time in three years.

Although the report presented a gloomy outlook for service providers, it said users stand to gain from carriers' aggressive price competition, which promises to keep service rates stable.

In addition, carriers are expected to pump even more money into building and maintaining digital networks to improve service quality and reliability, according to "The U.S. Industrial Outlook 1991," a report published annually by the Commerce Department.

"[A] strong area of competition will continue to be the intra-corporate communications and private network market, as the top three carriers compete fiercely for lucrative corporate contracts, many worth tens of millions of dollars," the Commerce Department said in the report.

However, the department forecast that revenue growth for both domestic and international

services will ease by one-half of a percentage point this year, despite hefty increases in network traffic. Spurred by price decreases after divestiture, the average number of local calls placed per day grew by 35%, from 1.1 billion to 1.5 billion in 1990, and the average number of long-distance calls each day nearly doubled from 88 million to 162 million by the end of 1990, the Commerce Department said.

The revenue slowdown will be caused in part by a worsening U.S. economy, which may cause many corporations to trim their network budgets, the report said.

But despite declining revenues projected for 1991, the Commerce Department said there will be some growth areas. The market for fractional T-1 services is expected to continue at a dizzying growth rate of 50% or more in 1991, the department said. Also, the department stated that it expects continued rapid growth in T-1 circuit usage.

The report also predicted continued sales in newer technology areas such as Integrated Services Digital Network and "self-healing" networks introduced by the regional Bell holding companies that allow almost instantaneous recovery from network outages.

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NATA predicts growth for overall U.S. telecom equipment market in '90s.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — The North American Telecommunications Association (NATA) kicked off the new year with the release of a report predicting five-year growth patterns for a variety of domestic network equipment markets.

The trade association's "1991 Market Review and Forecast" predicts that the overall U.S. telecommunications equipment market will grow to \$58.3 billion by 1995. That growth represents a steady increase over five years from the \$32.7 billion spent on equipment in the U.S. in 1989.

NATA's equipment statistics, gathered from surveys of manufacturers and information from outside research firms, shows, among other things, relatively flat sales for private branch exchanges, modems and key systems. It also shows rising sales of local-area network products, radio communications equipment, facsimile machines and multiplexers.

NATA reported that the total annual sales of PBX lines have grown from 3.8 million lines in 1984 to 4.2 million in 1989. That represents 25,000 units, valued

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Correction: The story, "AT&T shifts sales tactics for Tariff 12," (NW, Dec. 17, 1990) stated the incorrect minimum annual charge for

General Electric Co.'s five-year Virtual Telecommunications Network Service Option 7.

The correct figure is \$60 million.



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See The FAXNeT Form on Page 26

Chapter 11 paves way for Revco to overhaul its net

By filing for bankruptcy, the drug store chain freed up funds for new private X.25 backbone net.

By Bob Brown
Senior Editor

TWINSBURG, Ohio — For most companies, filing for protection from creditors under Chapter 11 of the Federal Bankruptcy Act means postponing high-priced projects and scrambling for survival.

But Revco Drug Stores, Inc.'s entry into Chapter 11 proceedings in 1988 freed up capital for the retailer to invest several million dollars into a private X.25

backbone net that is helping it boost customer service and forge closer ties with the insurers that compensate it for filling prescriptions.

The recently completed data network, which took about 18 months to build, enables Revco employees to determine up front whether an insurance company will cover a customer's prescription costs or whether a customer needs to pay on the spot, said Joe Brink, Revco's manager of net-

work engineering.

This helps Revco reduce the chances of getting stuck with the tab for a prescription if the customer is not adequately insured. Previously, Brink said, the company lost as much as \$500,000 a week on prescriptions that were not covered by insurers and could not be collected from customers.

The network is anchored here by an IBM 3090-200 mainframe, which supports point-of-sale and accounting applications, and a Tandem Computers, Inc. eight-processor Cyclone computer, which supports Revco data bases containing information about the drugs for which individual insurance companies will pay. The two machines are tied via X.25 links to four Netrix Corp. #1-Integrat-

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Predictive dialing praised

continued from page 1

base. When the system reaches a person, it immediately forwards the call to a waiting agent while simultaneously transferring account or other information about the called party to the agent's terminal.

The systems detect busy signals, operator-recorded messages and unanswered calls, and disconnect these calls rather than pass them to an agent. As a result, the systems increase the time operators spend talking to customers from about 20 minutes per hour to as much as 50 minutes, depending on the application, according to users of the systems.

Predictive dialing systems made their appearance about three years ago and have been implemented primarily by collection groups in banks, retail firms and utilities to contact customers delinquent on payments. Newspapers and direct marketers have also begun using the systems to sell new services and products, as well as to verify deliveries.

Great potential

But users say the potential uses of predictive dialing are almost limitless.

"This is an up-and-coming technology that could spell the difference between success and failure for many companies," said Patrick Springer, a consultant at the Computer Task Group/TMC in Needham Heights, Mass. "Many network managers are missing the boat because they're not conversant with it."

Users contacted by *Network World* described a host of benefits from predictive dialing.

The News and Observer, a daily newspaper in Raleigh, N.C., uses a 12-station predictive dialing system from International Telesystems Corp. (ITC) in Herndon, Va., to sell newspaper subscriptions and to verify delivery to new customers.

The system has enabled the

newspaper to boost subscription sales from about 375 orders a week to 580 orders and reduce the number of telemarketing agents from 18 to 12.

"The day we implemented the system — Aug. 21, 1989 — will be embedded in my memory forever," said Judy Simmons, who handles circulation sales for the newspaper. "It's made such a positive difference in our productivity and the way we work."

Barclays Bank

Barclays Bank of Delaware, N.A. uses a 94-station system from Digital Systems International, Inc. of Redmond, Wash., to collect on overdue credit card payments.

The system, which dials two million calls a month, has enabled the bank to quadruple its calling output without increasing the size of its 190-person collection staff.

Collection agents now spend about 50 minutes of every hour talking with customers, compared to about 15 minutes an hour before the predictive dialing system was implemented. As a result, the bank has reduced collection costs from \$14 per delinquent account to \$8 an account, and the system paid itself off in less than six months.

Another financial institution, NCNB Bank of North Carolina, uses a 16-station system from ITC to dial between 7,000 and 12,000 customers a day who are more than 10 days delinquent on their consumer loan payments.

In a given day, the bank's collection unit contacts 15% more customers and generates 13% more promises to pay on delinquent loans using the same number of agents than it did before implementing the predictive dialing system.

How it works

Collection agents at NCNB Bank of North Carolina in Greensboro sit at one of 16 terminals linked to ITC's ComPlus predictive dialing system.

Each night, systems operators at the bank's data center in Tampa, Fla., download an average of 10,000 customer account files to the ComPlus system in Greensboro, which dials customers from 8:30 a.m. to 9 p.m.

When a live connection is made, the system passes the call to an available agent along with basic account information — name, address, account number, the amount overdue and its due date — that was downloaded from the mainframe that night.

If additional account information is required, the agent hits a smart key on the keyboard, which establishes a Systems Network Architecture session with the IBM host in Tampa in a separate window on screen.

The host and the ComPlus unit are linked via a dedicated 56K bit/sec link.

ComPlus, like other predictive dialing systems on the market, uses software based on a pacing algorithm that adjusts the speed at which the unit dials calls.

The software predicts when the next agent will be available to take a call by analyzing the average length of phone conversations, percentage of answered calls and number of operators using the system. Thus, the system automatically adjusts its dialing speed to the work pace of agents and the business they are transacting.

In telemarketing applications, predictive dialing systems can be programmed to avoid calling the same person more than once in a given time period or people who have requested not to be called.

The systems, which range from \$50,000 to \$300,000, also generate reports about average call lengths and number of connected calls, among other things.

"These [predictive dialing systems] are going to be the greatest things since popcorn and candy," said Bob Mason, manager of systems support and development at the State of California Franchise Tax Board in Sacramento, Calif. ■

GAO says mandating DDN for fed is waste of money

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — The General Accounting Office (GAO) issued a report last week stating that the Department of Defense may waste millions of dollars if it continues to mandate that all agencies use the Defense Data Network (DDN).

The GAO report was requested last year by Rep. Robert Wise (D-W.Va.), who wanted an examination of the cost-effectiveness of spending an additional \$126 million during the next seven years to expand the DDN. The GAO concluded that such an expenditure would likely be an inefficient use of taxpayer dollars.

One major problem cited by the GAO in its report is that the Defense Department does not consider the cost and availability

of less expensive communications options when mandating use of the DDN by defense-related agencies. In addition, it said the DDN is technically incompatible with many users' equipment and its packet-switching architecture is not suited to all data communications needs.

The DDN is a worldwide, packet-switching network that supports data communications among U.S. defense agencies. When the DDN was established in 1983, the under secretary of defense ordered that all defense-related agencies use the network. According to the GAO, the number of users on the network has increased by 83% since 1986.

But while the telecommunications industry has undergone dramatic pricing changes, the De-

(continued on page 55)

T-1 network keeps watch

continued from page 1

20 T-1 multiplexers configured in a mesh topology. It supports Whirlpool headquarters here, a Whirlpool Financial Corp. site in Lincolnshire, Ill., and manufacturing sites in Arkansas, Indiana and Ohio.

Those same sites were supported by the older analog Whirlpool net, which also had six point-to-point 56K bit/sec lines for local-area network bridging and three 384K bit/sec digital links for videoconferencing.

For the same price it paid for all of those lines, Whirlpool now leases 10 T-1 links from AT&T. These T-1s provide about four times as much bandwidth as the lines they are replacing, Deckert said.

Another benefit the T-1 net provides is the ability to automatically route around failed nodes or links in less than five seconds and typically in less than 1 1/2 seconds, Deckert said. That's a far cry from the five to 10 minutes it took to manually restore failed links in the old network.

Such management features, combined with the vastly increased available bandwidth of the T-1 net, enabled Whirlpool to justify the \$600,000 price tag of the NET equipment. That figure does not include the \$1,500 per month Whirlpool pays for EFMS.

What is included is the eight IDNX multiplexers and the high-end Series 5000 Network Management System.

The Series 5000, based on a Sun Microsystems, Inc. workstation, provides a graphical network representation that shows outages with varying colors and lets operators control the IDNXs using the graphical interface and

pull-down menus. Deckert said the system is so easy to use, it does not require expert operators.

"We don't have people available to run the network 24 hours a day," he said. "[The Series 5000] allows us to use computer operations personnel to at least monitor the network when network control center personnel aren't available."

In addition, EFMS helps Whirlpool diagnose network problems.

Running on a Sun workstation separate from the Series 5000, the EFMS is loaded with software that includes a knowledge base of likely causes of potential network problems. When it receives a fault message from any node, the EFMS runs a series of tests to find the cause of the problem, starting with the most likely cause as determined by its knowledge base.

For most alerts, a trouble ticket is generated and sent to the NET technical assistance center. Personnel there can also diagnose Whirlpool's nodes via dial-up links and, if necessary, dispatch the appropriate vendor to correct problems, Deckert said. That is an optional feature of the EFMS.

"It's actually taken a troubleshooting burden off the network control technicians and placed it where people are most capable of dealing with problem definition and resolution," Deckert said.

With its new T-1 net in place, Whirlpool is now positioned to expand the videoconferencing application that currently serves three sites on the backbone.

The net will also support the company's growing LAN bridging requirements, Deckert said. That growth is coming mainly from engineering graphics applications running on LANs at all eight sites. ■

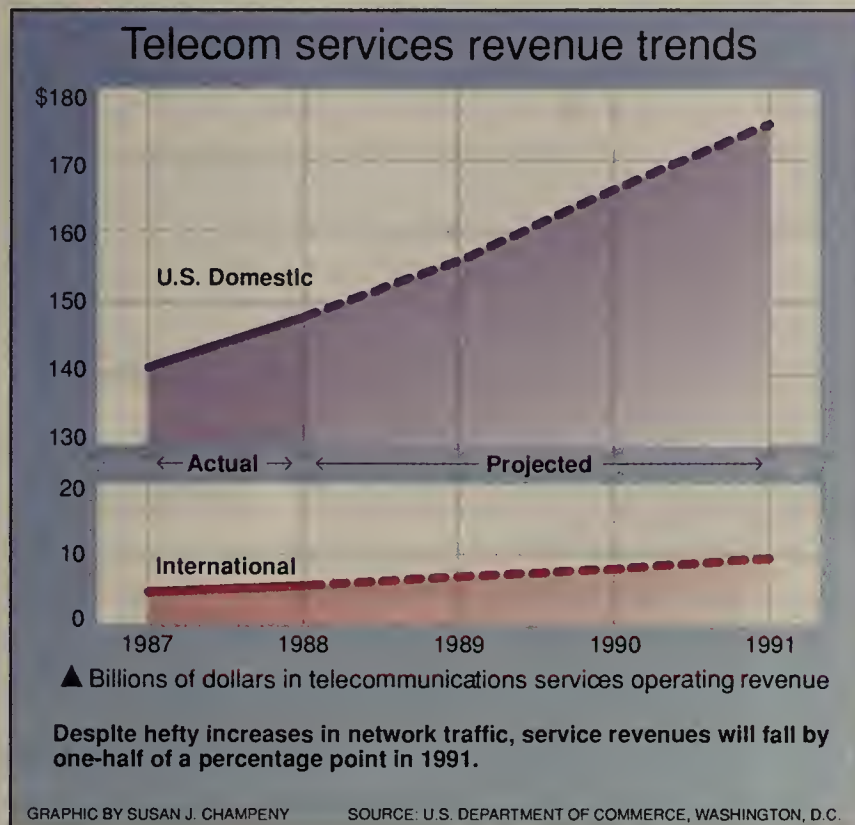
Commerce forecasts decline

continued from page 4

During 1990, more than 6,100 ISDN D-channel circuits were installed by 150 corporate customers, according to Federal Communications Commission data quoted in the Commerce Department report.

ISDN showed growth in 1990, which the report projected will slowly continue.

This interconnection problem should begin to ease in 1991 as RBHCs begin to reach significant levels of Signaling System 7 (SS7) implementation, the report said. It projects that both Bell Atlantic Corp. and BellSouth Corp. will have equipped about 80% of their access lines with SS7 in the first half of this year. ■



Mux newcomer airs T-3 box

continued from page 1

whose switch supports as many as 18 T-3 lines, are overkill for many users today, though they offer more growth potential for the future, he said.

T3plus is betting that Malone's assessment is correct.

"We decided to get out in the market as fast as possible with a product that people could grow with," said Alan Menezes, T3plus' director of marketing.

Although the BMX45 will initially support only two redundant

High Speed Data (HSD) card. Each HSD card supports two data inputs, which can be V.35, RS-442/449 or High Speed Serial Interface (HSSI) ports.

HSSI is an emerging industry standard for a data interface that supports speeds of 1.5M bit/sec or higher. It is key to the BMX45's ability to support data applications of varying bandwidths because users can configure it to support channels of whatever size they need, in effect creating

cludes one CPU card, one T-3 trunk card, one HSD module and a redundant power supply. A similar three-board configuration for the BMX45S costs \$24,000.

T3plus will offer a personal computer-based management system with a Microsoft Corp. Microsoft Windows 3.0-based graphical interface to aid users in managing BMX45 networks. That system will be priced at \$5,000.

By July, the company will ship a Unix-based management system supporting the Simple Network Management Protocol (SNMP). This system will allow the BMX45 to be monitored and controlled by any third-party SNMP management station, Menezes said. The Unix-based system has not yet been priced.

Further down the road, the company plans to offer support for the Open Systems Interconnection Common Management Information Protocol, which will enable an OSI-compatible umbrella management system to control the BMX45.

Likewise, T3plus plans other BMX45 enhancements to keep pace with user requirements, such as support next year for mesh networking, which would enable the switch to automatically route around failed nodes or links. Adaptive, NET and Timeplex all claim to support that capability in their offerings, but analysts said support for ring or

“We decided to get in the market fast with a product that people could grow with.”

▲▲▲

T-3 lines, Menezes said the company plans to offer models that support far more T-3s. He said it would be inappropriate to discuss details of those products until they are closer to shipping.

T3plus, which began operation in late 1989, also offers a T-3 data service unit.

The company will offer two models of the BMX45, including the five-slot BMX45S. The low-end BMX45S accepts one CPU card and two T-3 interfaces — one used for the primary trunk and the other to support a backup T-3. That leaves either two or three ports for voice, data or video input modules.

The larger BMX45A has a redundant power supply and supports 18 slots. That provides room for two CPU cards and four T-3 cards, with two acting as backups. Under that configuration, 12 slots would be left for input port modules.

The company offers two types of port modules — one of which supports a maximum of four T-1 inputs, with the other being a

their own fractional T-3 pipes.

Malone noted that Adaptive's T-3 switch also supports HSSI but is not due to ship until mid-year. NET's IDNX/90 lets users configure channels of multiple T-1s but can be cost prohibitive unless a user is upgrading an existing IDNX multiplexer, he said.

The price of more features

"The base price of the [IDNX/90] for an entry-level

T3plus plans BMX45 enhancements to keep pace with user requirements.

▲▲▲

configuration is over \$100,000," Malone said. The IDNX/90 does, however, offer a variety of advanced networking features.

By contrast, a base configuration for the BMX45A costs \$30,900, Menezes said. That in-

drop-and-insert configurations should be sufficient to address most users' needs today.

According to Menezes, the company is also working on support for services such as Synchronous Optical Network. ■

NATA predicts equipment growth

continued from page 4

at \$2.8 billion total, shipped in 1984, and 29,000 units, valued at \$2.9 billion total, in 1989.

By 1995, sales of PBX lines should hit 5.4 million, with system sales to reach 32,000 units, valued at \$3.4 billion.

The installed base of Centrex lines available through the local exchange carriers increased from 22 million lines in 1984 to 25 million in 1989 and is expected to grow to 29 million by 1995. NATA said customer costs for Centrex lines are roughly equivalent to those of PBX lines.

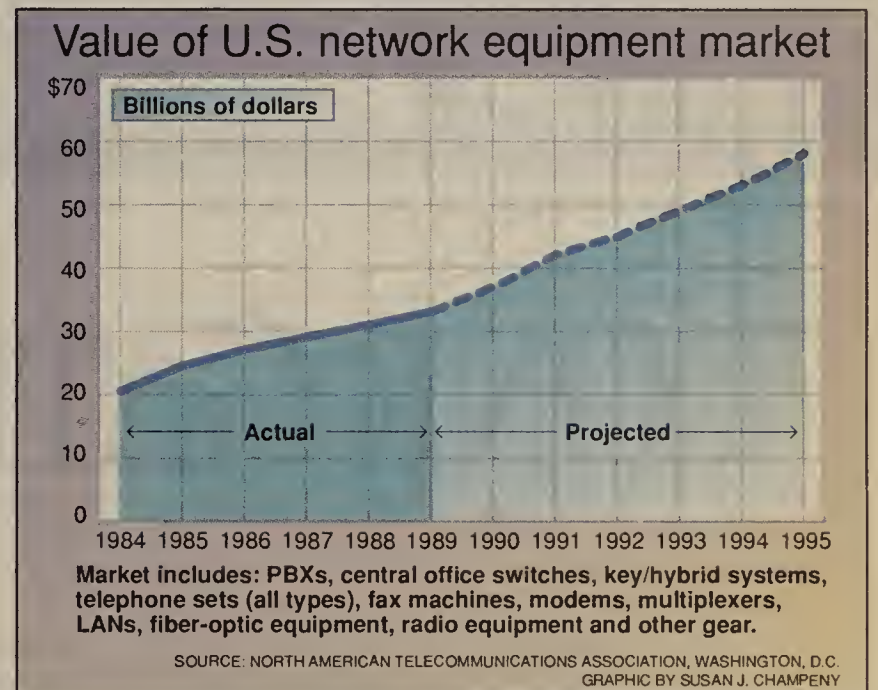
According to Eric Nelson, NATA's director of market research, a strong growth area in voice telecommunications lies in the voice/call processing market, which NATA has divided into three segments: voice-messaging equipment, voice response equipment and automatic call distributors.

estimated at \$2.2 billion.

Although NATA concluded that long-distance carriers have largely finished upgrading their networks with fiber, the trade association expects to see local telephone companies deploy fiber during the 1990s, fueling further growth in this market.

NATA reported that the multiplexer market, including T-1 multiplexers, grew from \$550 million in 1984 to \$1 billion in 1989. The market is expected to top off at \$1.6 billion by 1995. NATA surmised that the growth will be driven by increased use of T-1 networks for both voice and data transmission.

NATA reported that, although the market for modems showed a healthy average annual growth rate of 13.1% between 1984 and 1989, with sales topping \$2 billion in 1989, the annual growth is expected to slow to 1.4% in the



Voice-messaging equipment, with sales of \$665 million in 1989, grew at a 9.3% average annual growth over five years and hit an estimated \$1.2 billion in 1990. Exact figures for 1990 will not be available until later this year.

But voice response systems, which allow interaction between a caller and a company's data base in order to handle banking transactions, catalog purchases and other applications, are expected to do even better.

According to NATA's figures, the voice response equipment market jumped from \$10 million in 1984 to \$350 million in 1989. Equipment sales were projected at \$563 million for 1990 and are expected to grow to nearly \$1.4 billion in 1995, an average annual growth rate of 20.1%.

On the data side of the industry, NATA expects the LAN market to grow from \$1.4 billion in 1989 to \$2.9 billion in 1995. NATA predicts that users will increasingly use fiber optics in their LANs, giving the fiber-optic equipment market a boost to \$5.8 billion in 1995, an average annual growth rate of 18% from 1990,

next five years, with sales of \$2.6 billion anticipated for 1995. NATA predicted that demand would spring largely from consumers buying modems for use with home personal computers.

Rosy forecast

Nelson conceded that NATA's rosy forecast of the future stands in contrast to the clouds of recession gathering on the horizon. "We're getting a lot of positive feedback from vendors," Nelson emphasized. "It's hard for me to predict gloom and doom."

"We considered the effects [of a recession] on the industry," he said. "But from what we hear from the Commerce Department, it appears the recession is not going to be that severe and the economy will rebound toward the middle of 1991."

Although NATA's report had traditionally been released annually, NATA plans to release at least one follow-up report this year in order to track market developments more rigorously. The first update will be released this spring, showing definitive vs. estimated figures for 1990 across all industry segments. ■



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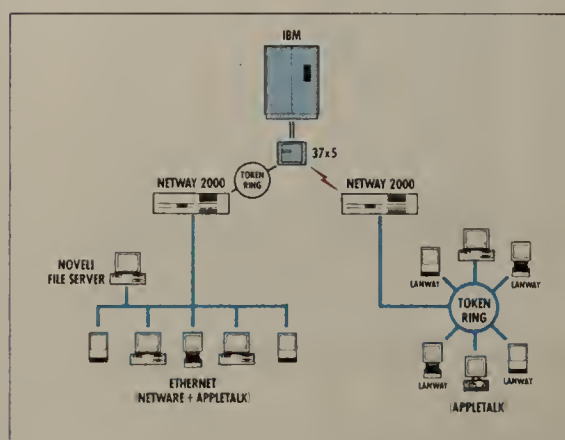
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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

Leading local-area network vendor Novell, Inc. makes its products available through 5,849 U.S. resellers, according to Computer Intelligence, a La Jolla, Calif., market research firm. More resellers carry Novell products than LAN products from 3Com Corp., IBM, Apple Computer, Inc. and AT&T combined, the firm said.

People & Positions

Michael Doss has been appointed vice-president and general manager of **Northern Telecom, Inc.**'s Data Networks division. Doss will be responsible for the Data Networks division in Research Triangle Park, N.C., which markets the DPN-100 digital data packet networking system in the U.S.

Doss replaces **William Pfeiffer**, who recently joined **US Sprint Communications Co.**

Previously, Doss was vice-president of marketing for Northern Telecom's Integrated Network Systems Group, with responsibility for the Northern Telecom/IBM alliance.

Craig Benson, chairman, treasurer and chief operating officer of **Cabletron Systems, Inc.**, and **Robert Levine**, Cabletron's chief executive officer, have been named *Entrepreneurs of the Year* by *Inc. Magazine*.

In seven years, Benson and Levine have nurtured their Rochester, N.H., manufacturer of wiring and intelligent hub products to produce more than \$100 million in revenue. The *Entrepreneur of the Year* program is sponsored by *Inc. Magazine*, Ernst & Young and Merrill Lynch & Company, Inc.

Report advises formation of net security task force

Group would boost awareness of security issues.

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — Concluding that security risks to business data are increasing as networks proliferate, a recently released report calls for the formation of a user-driven organization to improve products and heighten user awareness of security issues.

The report, "Computers at Risk," stated that users and vendors are still in the dark about commercial system protection and added that an information security foundation should be formed to establish a set of so-called Generally Accepted System Security Principles (GSSP), requirements for designing and using computers and nets.

The report was authored by the System Security Study Committee, a 16-member industry and academic panel, including representatives from AT&T Bell Laboratories, BBN Communications Corp., Digital Equipment Corp., Rockwell International Corp. and Sears Technology Services, Inc., set up by the National Research Council's Computer Science and Telecommunications Board.

The report offers a candid assessment of the failure by users and vendors to adequately meet

the security demands of distributed systems.

"That today's commercial systems provide only limited safeguards reflects limited awareness among developers, managers and the general population of the threats, vulnerabilities and safeguards," the report stated.

The committee emphasized in its report that the formation of an information security foundation would enable users to define their security needs to vendors. The outcome would be better, more secure products, the report said.

The report suggested that the user organization could also build a national data base that catalogs and tracks virus outbreaks and incidents of security breaches in user networks.

The effect of such a data base, the report said, would be "to increase public awareness of successful penetrations and to assist security practitioners, who often have difficulty persuading managers to invest in security."

The study noted that a commonly reported problem is a lack of commitment by management to pay for security. "Vendors hear about what consumers would like, but they do not hear consumers say they will not buy products that lack security features," the study said. ■



Prodigy's Tony Mattera inspects network management workstations at a New York Telephone office.

N.Y. Tel CO upgrade to satisfy user needs

Local loop overhaul will support new services, provide redundant links to interexchange carriers.

By Bob Brown
Senior Editor

NEW YORK — New York Telephone Co. has nearly completed a major upgrade of its downtown central offices that could enable the company to offer new tariffed disaster recovery and bandwidth-on-demand services, among others, according to company officials.

Although reluctant to provide details, New York Telephone said it has invested heavily during the past few years to modernize its central offices with the latest in digital access and cross-connect systems (DACS) and to tie them to one another via a fiber-optic mesh network.

New York Telephone's downtown network upgrade, expected to be completed early this year, promises to provide highly reliable local connections and drastically improve the transition of local traffic to interexchange carriers.

In recent years, alternative access carriers have exploited these customer needs to lure business away from New York Telephone and other Bell operating companies.

New York Telephone is targeting five possible tariffed services to use its new downtown network infrastructure as early as next year. It hopes to improve provisioning of services — due to excess capacity of fiber links extending onto customer premises — and serve up new disaster recovery, bandwidth-on-demand and network management options, including the monitoring of traffic by customers.

In September, Prodigy Ser-

vices Co., a White Plains, N.Y., provider of information services, became the first and only New York Telephone customer to connect to the revamped downtown net. Others will be added in coming months as the Nynex Corp. operating company runs fiber-optic cables from the new net into downtown high-rise buildings.

The key components of the overhaul are 16 new T-1 and T-3 DACS from AT&T and DSC Communications Corp. that have been installed in 11 central offices.

New York Tel's upgrade promises to provide highly reliable local connections.



The DACS, which direct network traffic from central office to central office, are replacing older electrical systems that had to be rewired to reroute traffic.

New York Telephone's behind-the-scenes efforts to install the DACS and tie them together via fiber lines supporting speeds up to 1.7G bit/sec are designed to provide private network users with more reliable, redundant networks, according to Ted Gold, staff director for digital technologies at New York Telephone.

In the event of a downtown cable cut, for instance, the DACS have the intelligence to reroute (continued on page 10)

INDUSTRY BRIEFS

Western Union wraps up EasyLink sale. Western Union Corp. last week completed the sale of most of the assets of its Business Services unit, including its market-leading EasyLink electronic mail service, to AT&T for \$180 million in cash.

The proposed transaction was first announced in July 1990 but was delayed pending Western Union's ability to restructure its debt ("AT&T leapfrogs foes with EasyLink deal," *NW*, July 9, 1990).

Western Union said it will use most of the cash from the AT&T deal to pay off debt that was threatening to force the Upper Saddle River, N.J., communications company into involuntary bankruptcy. According to Robert Amman, Western Union's president and chief executive officer, the AT&T deal marks the end of Western Union's role as a telecommunications carrier. The company can now focus better on providing value-added services in the financial services market, among others, he said. Further, Amman warned that the company must refinance its debt in 1991 in order to survive.

AT&T plans to meld the Business Services unit into a newly formed AT&T unit comprising AT&T's messaging products and services.

PacBell, ACC team up. Pacific Bell's Data Communications Group recently announced an alliance with Advanced (continued on page 10)

N.Y. Tel CO upgrade to satisfy user needs

continued from page 9

calls automatically by switching them over an alternate fiber path or to an alternate central office.

The upgrades have been made necessary by growing user demand for such reliability, as well as competition provided by alternate access providers Teleport Communications Group and Metropolitan Fiber Systems, Inc., Gold said.

New York Telephone will centrally manage the DACS — which contain their own processors and solve most of their internal problems automatically — to monitor traffic flows through its downtown cen-

tral offices, Gold said. Using an AT&T software package called DACScan, New York Telephone is able to track potential problems and pinpoint actual problems, he said.

With the older systems, such surveillance was not possible and changes needed to be handled manually, Gold said.

"The current setup has just become too unwieldy," Gold said. "We're loaded down with wires that have to be moved manually; [DACs] have the intelligence to make changes automatically."

According to Gold, the Synchronous Optical Network-compatible DACS network "is going to be an integral part of our private-line infrastructure, and that's why we've been testing it all year."

The network infrastructure "will open the door for potential digital services," Gold said. "We want to leverage it to offer tariffed services."

Prodigy may be first in line for these new services.

New York Telephone has provided Prodigy with 45M bit/sec fiber circuits from its local Yorktown, N.Y., serving office to a central office in White Plains and from a serving office in Mount Kisco, N.Y., to the East 38th Street central office. These two main central offices provide Prodigy with alternate paths and reliable access to its long-haul carriers, through which the company provides its basic information services.

The new setup allows Prodigy to access

its long-haul carriers' points of presence (POP) downtown via the fiber mesh, said Tony Mattera, manager of network planning for Prodigy.

In the past, the long-haul carriers would have needed to run long, less reliable T-1 links from their POPs to Prodigy's entry point into Manhattan, the East 38th Street central office, he said.

"The long-distance carriers' POPs are spread out, so in order to get to 38th Street, they would have had long runs," Mattera said. "This makes it a much more reliable connection to that entry point."

While New York Telephone currently provides the management of this service, the network might someday enable the customer to reroute traffic from one long-haul carrier to another in the event a carrier POP experiences trouble.

"This will be a big plus for users who want to stay with New York Telephone for primary and alternate service," Mattera said.

The upgrades have been made necessary by growing user demand for such reliability.



Once New York Telephone has laid fiber cables into a customer's building, provisioning of tariffed services off the fiber net could take seven days or less, Gold estimated.

Rick Kozak, senior vice-president for network services at Metropolitan Fiber Systems, which recently announced the start of service in New York, said New York Telephone's fiber net is a sign that the Bell operating company has recognized the onset of competition. Although New York Telephone is now poised to offer disaster recovery services, thanks to its network upgrade, he said many users still will opt to split their local traffic between carriers so that they can play one carrier off another to get the best pricing and services. ■

Industry Briefs

continued from page 9

Computer Communications (ACC) that allows the carrier to serve as a single source for local-area network equipment and services.

Under the agreement, Pacific Bell will market ACC's Series 4000 and Series 2000 bridges and routers, as well as provide installation, support and management. Pacific Bell will sell the ACC equipment in conjunction with carrier services — including switched and private data services and Switched Multimegabit Data Service, a T-1 and T-3 fiber-optic-based service scheduled to be available next fall.

Pacific Bell plans to form additional alliances that will enhance its ability to provide complete LAN offerings.

For ACC, the alliance with Pacific Bell is part of the internetworking equipment maker's strategy to broaden its distribution channels through partnerships with major communications service providers, said Gary Krall, ACC's director of marketing. ■

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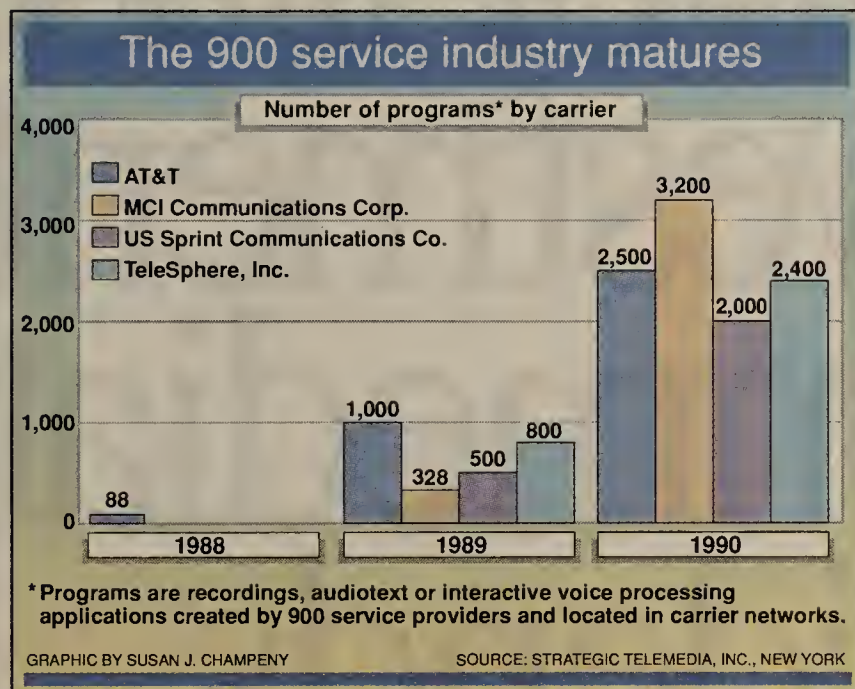
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Worth Noting

AT&T mistakenly billed 25,000 families and friends of those serving in the Persian Gulf for telephone calls placed during Thanksgiving week from soldiers in that region. The carrier had offered the service for free and said it will cancel those charges.



Users blast US Sprint for goading FCC on Tariff 12

No reason to tie up all VTNS deals, they say.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — A group of 22 users has sharply criticized US Sprint Communications Co. for its efforts to shape the FCC's reinvestigation into the legality of AT&T's Tariff 12.

The group, comprised largely of banks and financial services companies, is trying to block a request filed in November by US Sprint asking the Federal Communications Commission to include all Tariff 12 deals in its investigation.

In late October, a federal appeals court said the FCC had considered improper factors in approving the custom network deals and ordered the agency to reconsider Tariff 12. However, the court's ruling technically applies only to the first four Virtual Terminal Network Service (VTNS) deals, since those were the only offers existing when the appeal was filed.

In its November filing, US Sprint also told the FCC the court's decision raises such serious doubts about the legality of Tariff 12 that the agency should suspend all new filings until it can complete its investigation.

Taking aim at US Sprint

But in a letter to Richard Firestone, FCC Common Carrier Bureau chief, current and prospective Tariff 12 customers blasted US Sprint.

US Sprint's "intent is to harass customers who have entered into VTNS agreements and to draw the commission into a lengthy [and largely purposeless] trek through an unending record," stated the letter, which was drafted by Henry Levine, a Washington, D.C. attorney who has worked closely

with a number of Tariff 12 customers.

The group acknowledged that whatever decision the FCC ultimately reaches on the first four VTNS deals will apply to the remaining ones, but it said there was no reason to tie up those deals in an investigation.

Currently, 81 Tariff 12 deals are on file with the FCC.

The letter also lambasted US Sprint for seeking to suspend new Tariff 12 offers.

The users said suspension of new deals was unnecessary because the court's finding "neither darkens the sky over Tariff 12 [nor] constitutes a massive legal cloud."

US Sprint's "intent is to harass customers who have entered into VTNS agreements and to draw the commission into a lengthy trek."

▲▲▲

Members of the group that signed the letter of opposition include Baxter Healthcare Corp.; Goldman, Sachs & Co.; Kemper Financial Services, Inc.; Manufacturers Hanover Corp.; MasterCard International, Inc.; PaineWebber, Inc.; The Prudential Insurance Co. of America; Security Pacific Bank; USAir, Inc.; VISA U.S.A., Inc.; and Wells Fargo Bank, N.A. ■

Stakes high in war over 800/SDN deals

MCI files formal complaint asking FCC to reopen case, stop AT&T from packaging the services.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — MCI Communications Corp. is stepping up its efforts to prevent AT&T from using its dominant position in the 800 services market to leverage sales of other offerings.

Late last month, MCI filed a formal complaint with the Federal Communications Commission alleging that AT&T is offering customers discounts on bundled packages of 800 and Software-Defined Network (SDN) services. MCI claims that AT&T's marketing of the packages violates FCC rules and provisions of the Communications Act of 1934.

MCI and AT&T have been wrangling over this issue for 1½ years now. In June 1989, MCI filed an informal complaint alleging that AT&T was bundling the two services. The FCC threw out the complaint, saying it had insufficient evidence to reach a decision.

The battle has turned into a murky debate over just what constitutes an 800 service. Both carriers are likely to throw significant resources into this case since the stakes are high.

If the commission finds AT&T's actions to be illegal, the carrier would not be allowed to offer a package of SDN and 800 services for customers that are unwilling or unable to negotiate for custom network deals, such as those offered under Tariff 12. AT&T would also lose a weapon in the increasingly bitter battle over virtual network customers.

If AT&T is allowed to continue its current marketing practice, the competition could be damaged, making users the ultimate losers, MCI claims.

MCI is trying to persuade the FCC to reopen the issue by presenting new evidence from seven customers: IMCO Realty Services, Des Moines Area Community College, Walgreen Co., the state of

(continued on page 14)

WASHINGTON UPDATE

FCC takes more time to review Tariff 12 deals.

The Federal Communications Commission has asked AT&T for more time to evaluate a group of Tariff 12 deals, three of which were filed after a court overturned the FCC's decision allowing Tariff 12. In response, AT&T late last month moved the effective date of four Tariff 12 "options" from various dates in December to Jan. 12.

A number of parties have filed petitions with the FCC, claiming that the court's ruling throws the legality of Tariff 12 so seriously into doubt that the agency should suspend all deals filed after the court action.

A Tariff 12 deal filed for John Hancock Mutual Life Insurance Co. one day after the court's ruling will be the test case. That deal and offers to two unnamed customers were deferred last month by AT&T. AT&T also deferred a fourth deal for Alexander & Alexander Services, Inc., which was filed before the court's ruling.

It is not uncommon for the FCC to request more time to review tariffs, and the deferral is not necessarily an indicator that the agency will suspend deals filed after the court's ruling. Tariff 12 users can take some comfort from public comments by Richard Firestone, FCC Common Carrier Bureau chief, that he wants to keep Tariff 12 on track.

AT&T had better luck last month with two other Tariff 12 deals, one for Marine Midland Bank, N.A. and the other for an unnamed customer. The FCC allowed both three-year deals to take effect despite objections from competitors.

The deal for Marine Midland is worth a minimum of \$3 million annually, and the other offering is worth \$15.6 million annually.

The FCC said these two deals would be subject to the

(continued on page 14)

Carrier Watch

R.R. Donnelley & Sons Co., the nation's largest commercial printing company, recently signed a five-year customer-specific contract with Indiana Bell Telephone Co. for 900 lines of digital Centrex.

The Centrex service will be installed by Feb. 15 to replace premises-based switches at two R.R. Donnelley printing facilities, according to an Indiana Bell spokeswoman.

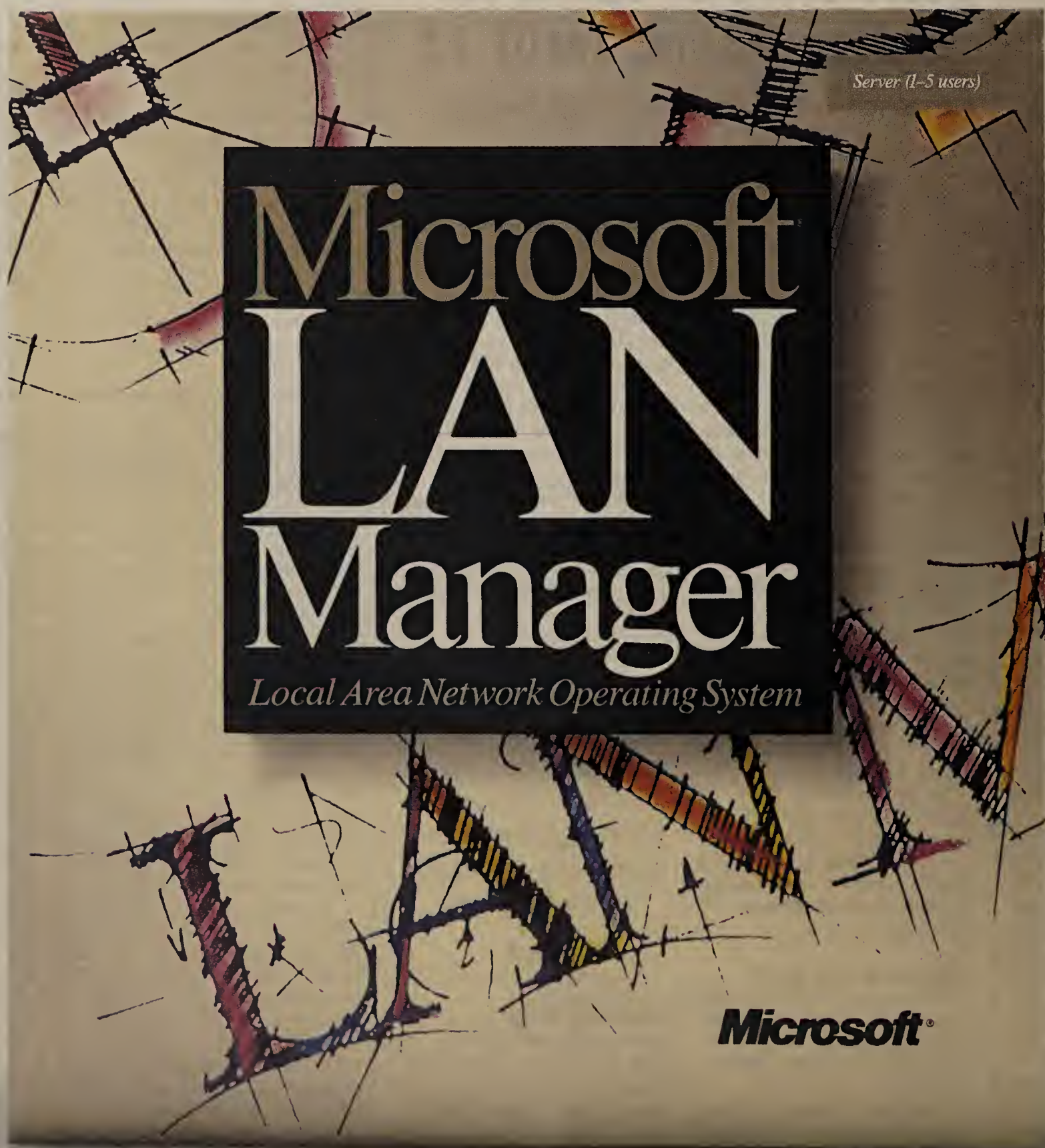
Customer-specific agreements enable telephone companies to provide off-tariff prices in return for long-term contracts. Neither party would divulge the value of the contract.

The R.R. Donnelley plants are located one mile apart and will be served by a single existing Northern Telecom, Inc. DMS-100 digital switch in Indiana Bell's Crawfordsville, Ind., central office. Employees at the two plants will be able to use four-digit dialing to reach any Centrex station.

Penn Access Corp., a Pittsburgh bypass carrier, recently received approval from the Pennsylvania Public Utility Commission to begin offering alternate access services to users in Allegheny and Beaver counties over a 60-route-mile fiber-optic network currently under construction.

Penn Access will provide users with an alternative to local access services provided by The Chesapeake and Potomac Telephone Co. of Pennsylvania and Metropolitan Fiber Systems, Inc. of Pittsburgh. ■

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An observation not overlooked by

the many systems companies who are selling and supporting it to the fullest.

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Stakes high in war over 800/SDN deals

continued from page 11

West Virginia, State Mutual Life Assurance Co. of America, Becton, Dickinson & Co. and an unnamed customer.

The evidence ranges from an executive summary of an AT&T proposal for IMCO Realty Services to a letter from the network manager of Walgreen written to the FCC questioning the legality of a bundled SDN and 800 deal AT&T was offering.

Gary Jensen, manager of voice communications for Walgreen, said AT&T was offering to bundle its Megacom 800 service with SDN and give discounts on the combined usage. In his letter, he expressed

concern about the deal, saying, "Walgreen does not want to enter into an agreement with AT&T, only to have the rug pulled out from under us when the FCC decides that

vice. MCI admits that AT&T is not outright bundling 800 and SDN services, but rather is using a backdoor method to achieve the same outcome. AT&T claims that MCI is

“Walgreen does not want to enter into an agreement with AT&T, only to have the rug pulled out from under us.”

▲▲▲

the AT&T proposal is not legal.”

The controversy over AT&T's offers revolves around the definition of an 800 ser-

mischaracterizing an 800-like feature it offers through SDN.

The SDN feature, known as Network Re-

mote Access Option III-Express, allows customers to dial an 800 number from an off-network location and automatically be terminated over the SDN network at a predetermined on-network location.

AT&T claims that this is not an 800 service but an access option for SDN customers. The carrier says it chose an 800 number for the access only because it was the most economical technology available when the feature was introduced. AT&T also says the 800 access feature is not equivalent to its 800 services because it “does not meet the need for high volumes of inbound calling, which AT&T 800 service satisfies.”

But MCI says it has discovered several AT&T users that have been told they can use their existing 800 number under the SDN remote access feature with no changes to their service. MCI says that through that arrangement, AT&T is effectively offering customers discounts on 800 service if they purchase other services, such as SDN.

FCC rules will have been violated if AT&T's remote access feature is judged to be an 800 service and AT&T is proven to be bundling it with SDN. Last June, the commission rejected as unlawful a tariff AT&T filed that would have offered discounts on combined SDN and 800 service.

Users may have a long wait until the issue is resolved, considering that the FCC took 18 months to dispense with the informal complaint that MCI lodged. **■**

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Washington Update

continued from page 11

outcome of a proceeding the agency will conduct later this year to reconsider the legality of Tariff 12.

AT&T offers overseas Tariff 16. AT&T recently introduced four new overseas transmission options for government users under Tariff 16, through which AT&T provides services for competitively bid government contracts. All of the offerings are T-1 satellite links between U.S. locations and sites in the Persian Gulf and will be sold to the Defense Electronics Communications Contracting Organization.

Three of the options provide a T-1 circuit between an AT&T central office in New York and dedicated earth stations at unspecified sites in the Persian Gulf. The monthly recurring charge for each is \$30,000, and all have a onetime charge of \$3,000.

The fourth option provides a T-1 circuit between AT&T's central office in Houston and a dedicated earth station in the Persian Gulf. The link has a monthly recurring charge of \$62,500 and a onetime charge of \$3,000. All of the options are offered for a minimum of one year.

AT&T raised eyebrows in the telecommunications industry in 1989 with its first overseas private line offered under Tariff 16 for the Army-Air Force Exchange Service.

That deal was for a single 64K bit/sec line between Dallas and Germany. Some observers questioned why AT&T was tariffing a single data line as a special offering.

AT&T has provided a variety of special discounted deals through Tariff 16. A provision in the Communications Act of 1934 allows carriers to establish different rates and terms for service to government users vs. those in the private sector. **■**

DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

The U.K.'s Midland Bank recently linked its 1,949 automated teller machines to Eurocard International's European Payment Systems Services network, thus enabling MasterCard International, Inc. and Cirrus System, Inc. cardholders to get cash from the ATMs.

Data Packets

Universal Data Systems last week cut prices by as much as 31% on most of its existing CCITT V.32-compatible modems that operate over dial-up or leased lines at 9.6K bit/sec.

The firm said all models of its FasTalk series will sell for \$795. The steepest price drop was the 31% reduction for the FasTalk 2/V.32/42b, which employs V.32 as well as CCITT's V.42bis error correction and data compression standard.

The same price cut was also made on the FasTalk V.32/42b, an earlier version of the FasTalk 2/V.32/42b. Both previously sold for \$1,145.

The FasTalk V.32/42 PC, a board-based version of the FasTalk 2/V.32/42 for microcomputers, and the FasTalk V.32/42, which only supports CCITT's error correction standard, previously sold for 24% more at \$1,045.

Lastly, the three FasTalk models that support Microcom, Inc.'s Microcom Network Protocol (MNP) error correction and MNP Class 5 data compression — the FasTalk 2/V.32/5, FasTalk V.32/5 and FasTalk V.32/5 PC — sold for \$995 each, a 20% difference.

The firm also decreased the price of its central-site V.3225 stand-alone modem from \$1,145 to \$950 and its rack-mountable V.3225 modem board from \$1,120 to \$930. ■

Multispeed DSU gaining popularity

	1990	1991	1992	1993	1994	1995
Subrate DSU (19.2K bit/sec and below)						
Units shipped	41,176	38,294	33,699	27,634	22,384	17,800
Installed base	227,111	265,405	299,104	326,738	349,122	366,922
56K bit/sec DSU						
Units shipped	26,750	24,075	20,946	17,805	15,135	12,864
Installed base	141,900	165,975	186,921	204,726	219,861	232,725
Multirate DSU (56K bit/sec and below)						
Units shipped	28,014	40,435	62,348	89,875	106,850	116,467
Installed base	81,751	122,186	184,534	274,409	381,259	497,726
56K bit/sec DSU with secondary channel (for net management)						
Units shipped	5,572	6,645	7,987	8,793	8,169	7,010
Installed base	15,414	22,059	30,046	38,839	47,008	54,018
Switched 56K bit/sec DSU						
Units shipped	3,274	4,158	4,765	5,265	5,792	6,327
Installed base	17,260	21,418	26,183	31,448	37,240	43,567
T-1 DSU						
Units shipped	63,393	76,817	84,268	92,610	100,910	109,790
Installed base	194,350	271,167	355,435	448,045	548,955	658,745

According to a recent study, users will replace subrate DSUs and 56K bit/sec DSUs with multirate DSUs that can access a wider range of digital circuits.

DSU = Data service unit

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

Study finds user demand growing for multirate DSUs

Growth attributed to usage of digital 56K services.

By Jim Brown
Senior Editor

FRAMINGHAM, Mass. — Users will buy fewer subrate and fixed rate 56K bit/sec data service units (DSU) over the next five years as they opt for more flexible, multirate DSUs, according to a recent study by International Data Corp., a market research firm based here.

The study, "Carrier Services and Flexible Equipment Platforms Shape Growth in the DSU Market," said users are increasingly asking for multispeed DSUs that can be used with digital services operating at speeds up to 56K bit/sec.

Most existing subrate DSUs support multiple rates but only at speeds up to 19.2K bit/sec, meaning users have to opt for fixed rate DSUs to support 56K bit/sec circuits.

The study predicts that annual sales of subrate DSUs will slip from 41,176 in 1990 to 17,800 in 1995 while sales of 56K bit/sec fixed rate DSUs will drop from 26,750 to 12,864 in 1995.

During the same period, annual sales of multirate DSUs are expected to jump from 28,014 to 116,467 (see graphic, this page).

The only bright spot for the 56K bit/sec fixed rate DSU market is the segment for those units offering a secondary channel for network management. The study predicts annual sales of these de-

vices will increase from 5,572 in 1990 to 8,793 in 1993 but then drop to 7,010 by 1995. One reason offered for the price nosedive is the expected introduction of carrier net management services providing the same functionality.

Users are also expected to buy more DSUs designed to access switched 56K bit/sec digital services as carrier deployment of those service increases.

The advent of video coders/decoders capable of making full-motion videoconferencing possi-

The only bright spot for the 56K fixed rate DSU market is for those units offering a secondary channel for network management.



ble via a single switched 56K bit/sec link is also expected to increase purchases of switched 56K bit/sec DSUs.

Lastly, the study predicted the number of T-1 DSUs sold will increase steadily as users continually deploy T-1 circuits in their backbone networks. ■

New NetView pricing favors central mgmt.

Users may want to rethink net management architectures to take advantage of price breaks.

By Paul Desmond
Senior Editor

Recent packaging and pricing changes to IBM's NetView may encourage some users to rethink their net management strategies because those that implement a centralized management architecture will pay less for the net management software.

Under NetView Version 1, IBM offered only one NetView version for each class of mainframe and users needed to run that software on every computer they wished to manage. Consequently, there were no savings on NetView for users that implemented a centralized management strategy.

Under that centralized strategy, NetView runs on numerous mainframes in a network and controls devices attached to those mainframes.

But all management data is shipped to one or two mainframes, also running NetView, that control the remote mainframes. NetView console operators are not required at the re-

mote sites.

When NetView Version 2 was announced in September 1990, IBM added a new wrinkle by offering different NetView packages.

The Distributed System Option package, which supported NetView-to-NetView communications but no operator interface, was intended for use on remote mainframes in a centralized management configuration.

It was priced less than the Centralized System Option, which supported an operator interface and was to be used on the small number of mainframes from which operators would control the network.

Many users initially balked at the new packaging and pricing. For those that did not implement the Distributed System Option, the price increase for Version 2 was significant because they needed numerous copies of the most expensive piece — the Centralized System Option.

(continued on page 53)

NADA, Hughes, carmakers form VSAT net alliance

By Jim Brown
Senior Editor

MCLEAN, Va. — The National Automobile Dealers Association (NADA) has formed an alliance with Hughes Network Systems, Inc., General Motors Corp. and Chrysler Corp. to build a shared VSAT network that promises to cut communications costs for dealers selling cars from more than one manufacturer.

The shared very small aperture terminal net will enable these multifranchise dealers to communicate with multiple carmakers via a single communications link. Currently, multifranchise dealers often maintain separate VSAT or leased-line links to each carmaker's data center.

Under earlier arrangements, both GM and Chrysler dealerships were already being outfitted with Hughes VSATs that provide dedicated links to GM's or Chrysler's host processors to enable a dealer to order cars and parts or retrieve vehicle warranty records.

With the shared VSAT net, dealers selling both GM and

Chrysler products will link GM and Chrysler terminals to a Hughes indoor unit, which is attached to the VSAT. The indoor unit wraps data received from those terminals into X.25-based packets using Hughes' proprietary Spacelink protocol.

The VSAT will bounce data off a satellite at up to 128K bit/sec to a Hughes packet switch at either GM's or Chrysler's hub. The packet switch will unwrap data from Spacelink packets and forward it via a leased line to the appropriate manufacturer's host.

NADA is urging other car manufacturers such as Ford Motor Co. and foreign companies to join in the shared VSAT network. Dealers that do not sell GM or Chrysler cars will be linked to a Hughes hub that will provide the land line links to other carmakers.

"The basic idea is to try and limit the number of VSATs at multifranchise dealerships," said Jake Kelderman, executive director of NADA's industry affairs group.

(continued on page 53)

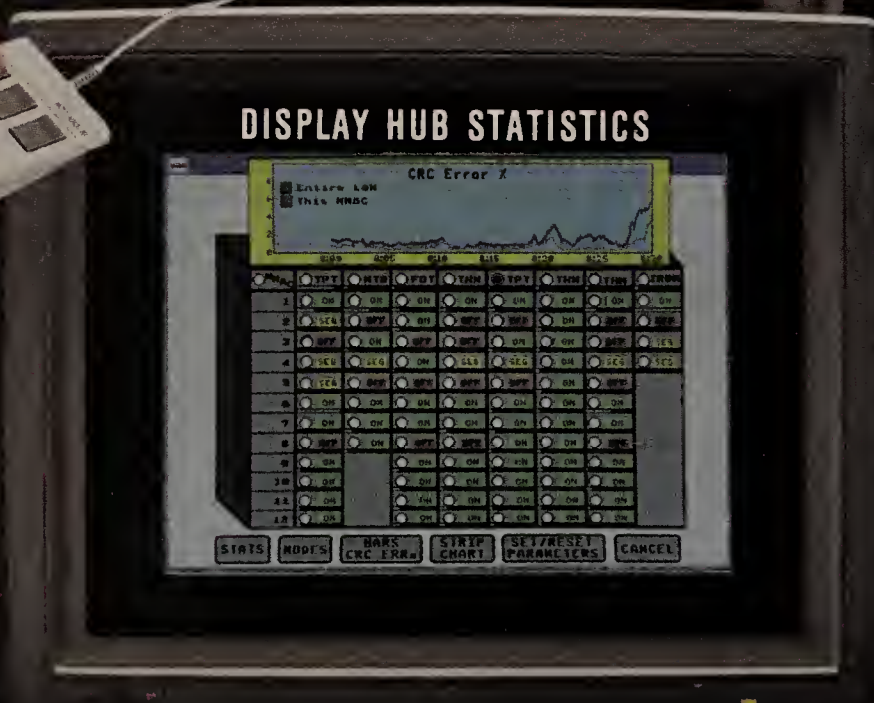
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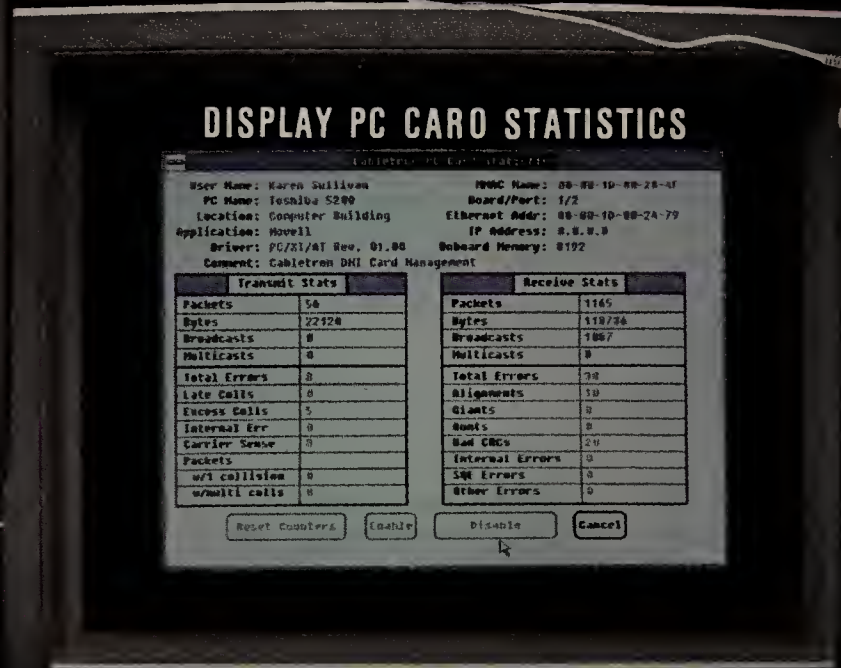
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C. Please Answer ALL Questions, Sign & Date the Form.

1 Industry: (check one only)

01. ☐ Manufacturers (other than computer/communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
13. ☐ Government State/Local
14. ☐ Government Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/Systems House
22. ☐ Distributor, Computer Related
23. ☐ Distributor, Communications Related
24. ☐ Other

2 Job function: (check one only)

1. ☐ Networking Management (Responsible for both voice & data)
2. ☐ MIS Management (VP, Dir., Department Head)
3. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
4. ☐ Data Communications Management (Responsible for data only)
5. ☐ Telecommunications Management (Responsible for voice only)
6. ☐ Financial Management
7. ☐ Engineering Management
8. ☐ Consultant (Independent)
9. ☐ Other

3 What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check one only)

1. ☐ Enterprise Wide (Organization/Subsidiary/Division)
2. ☐ Multi Enterprise (Consultants)
3. ☐ Department Wide

4 What is the total number of sites for which you have purchase influence?

1. ☐ 100 +
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1

5 Your primary responsibility: (check one only)

1. ☐ Both Data + Voice
2. ☐ Data Networking Only
3. ☐ Voice Networking Only
4. ☐ None

6 Which transmission media do you use in your network: (check all that apply)

- Public:
01. ☐ Switched-Based (DDD, Wats, Megacom, etc.)
 02. ☐ Leased Line (not including T-1)
 03. ☐ T-1
 04. ☐ Fractional T-1
 05. ☐ T-3/SONET
 06. ☐ Broadband
 07. ☐ ISDN
 08. ☐ Satellite
 09. ☐ Microwave
 10. ☐ Fiber Optic

7 Is your network: (check all that apply)

- | | |
|---|---|
| LOCAL AREA NETWORK | WIDE AREA NETWORKS |
| 1. <input type="checkbox"/> Local (within building) | 3. <input type="checkbox"/> International |
| 2. <input type="checkbox"/> Local (in a campus environment) | 4. <input type="checkbox"/> National |
| | 5. <input type="checkbox"/> Regional (several states) |
| | 6. <input type="checkbox"/> Metropolitan |

8 What is your network architecture? (check all that apply)

1. ☐ SNA
2. ☐ DECNET
3. ☐ OSI
4. ☐ GOSIP
5. ☐ MAP/TOP
6. ☐ TCP/IP
7. ☐ DCA (UNISYS)
8. ☐ OTHER

9 What is your LAN Operating System? (check all that apply)

01. ☐ 3COM (3+, 3+ open)
02. ☐ LOCAL TALK (APPLETALK)
03. ☐ BANYAN (VINES)
04. ☐ DCA (IRMALAN)
05. ☐ IBM (LAN Server)
06. ☐ IBM (PC LAN PROGRAM)
07. ☐ MICROSOFT (LAN MANAGER)
08. ☐ UNGERMAN BASS (NET/1)
09. ☐ NOVELL (NETWARE)
10. ☐ TOPS
11. ☐ PROTEON (PRONET)
12. ☐ OTHER

10 What is your LAN environment? (check all that apply)

1. ☐ 4M TOKEN RING
2. ☐ 16M TOKEN RING
3. ☐ ARCNET
4. ☐ ETHERNET
5. ☐ STARLAN
6. ☐ FDDI
7. ☐ LOCALTALK
8. ☐ 10BASET
9. ☐ OTHER

11 Which operating systems do you utilize? (check all that apply)

1. ☐ IBM DOS (VSE)
2. ☐ UNIX
3. ☐ OS/2
4. ☐ OS/2 Extended Edition
5. ☐ MVS
6. ☐ VM
7. ☐ VMS
8. ☐ XENIX
9. ☐ PICK
0. ☐ OTHER

12 Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAINFRAMES		MINIS
	A	B	
01. DEC			
02. IBM			
03. AMDAHL			
04. AT&T			
05. BULL HN IS			
06. NCR			
07. DATA GENERAL			
08. WANG			
09. HEWLETT PACKARD			
10. PRIME			
11. TANDEM			
12. UNISYS			
13. CONTROL DATA			
14. OTHER			

13 Please indicate by vendor the number of microcomputers/workstations:

- A. Presently installed in your network.
B. The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER/ WORKSTATION/ VENDOR	PRESENTLY INSTALLED		PLAN TO INSTALL NEXT 12 MONTHS
	A	B	
01. PCs based on 80286 chip			
02. PCs based on 80386 chip			
03. PCs based on 80486 chip			
04. 8086/8088			
05. Macintosh			
06. RISC-based workstations			
07. UNIX-based workstations			

14 What is your planned PC standard? (check all that apply)

1. ☐ EISA
2. ☐ MCA
3. ☐ NUBUS (MACINTOSH)

15 For which areas outside of the U.S. do you have purchasing influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East

16 Check ALL that apply in columns A and B

- A) I am presently involved in the purchase process for the following products/services:
B) I plan to purchase the following products/services in the next 12 months:

Presently Involved	A	B	Plan to Purchase	B
				LOCAL AREA NETWORKS:
01. <input type="checkbox"/>				Local Area Networks
02. <input type="checkbox"/>				LAN Servers
03. <input type="checkbox"/>				LAN Services
04. <input type="checkbox"/>				Cables, Connectors, Baluns
05. <input type="checkbox"/>				Bridges, Routers, Gateways
06. <input type="checkbox"/>				UPS
07. <input type="checkbox"/>				LAN Storage Devices
				COMPUTERS/PERIPHERALS:
08. <input type="checkbox"/>				Micros
09. <input type="checkbox"/>				Minis
10. <input type="checkbox"/>				Mainframes
11. <input type="checkbox"/>				Front End Processors
12. <input type="checkbox"/>				Terminals
13. <input type="checkbox"/>				Laptops
14. <input type="checkbox"/>				Printers
15. <input type="checkbox"/>				Work Stations
16. <input type="checkbox"/>				Cluster Controllers

(continued on next column)

Presently Involved	A	B	Plan to Purchase	B
				SOFTWARE:
17. <input type="checkbox"/>				Network Management
18. <input type="checkbox"/>				Micro to Mainframe
19. <input type="checkbox"/>				Network Security
20. <input type="checkbox"/>				Call Accounting
21. <input type="checkbox"/>				Distributed DBMS
22. <input type="checkbox"/>				Communications Software
23. <input type="checkbox"/>				Applications Software
24. <input type="checkbox"/>				Network Operating Systems Software
25. <input type="checkbox"/>				EDI Software
26. <input type="checkbox"/>				E-Mail Software
				DATA COMMUNICATIONS:
27. <input type="checkbox"/>				Modems (over 9.6kbps)
28. <input type="checkbox"/>				Modems (under 9.6kbps)
29. <input type="checkbox"/>				T-1 Multiplexers
30. <input type="checkbox"/>				T-3 Multiplexers
31. <input type="checkbox"/>				Fractional T-1 Multiplexers
32. <input type="checkbox"/>				Data Switches
33. <input type="checkbox"/>				Matrix Switches
34. <input type="checkbox"/>				Packet Switches
35. <input type="checkbox"/>				Protocol Converters
36. <input type="checkbox"/>				Network Management Systems
37. <input type="checkbox"/>				Terminal Emulation Boards
38. <input type="checkbox"/>				Facsimile Machines
39. <input type="checkbox"/>				Diagnostic Test Equipment
40. <input type="checkbox"/>				DSU/CSU
41. <input type="checkbox"/>				Data Security
42. <input type="checkbox"/>				Data Compression Equipment
43. <input type="checkbox"/>				Network Adapter Boards
44. <input type="checkbox"/>				Microwave
45. <input type="checkbox"/>				Messaging Software
				TELECOMMUNICATIONS:
46. <input type="checkbox"/>				PBXs (over 1000 lines)
47. <input type="checkbox"/>				PBXs (200 - 1000 lines)
48. <input type="checkbox"/>				PBXs (under 200 lines)
49. <input type="checkbox"/>				Key Systems
50. <input type="checkbox"/>				Automatic Call Distributors
51. <input type="checkbox"/>				Voice Messaging Systems
52. <input type="checkbox"/>				Video Teleconferencing Systems
				SERVICES:
53. <input type="checkbox"/>				Switched Voice
54. <input type="checkbox"/>				Dedicated Leased Line
55. <input type="checkbox"/>				T-1
56. <input type="checkbox"/>				T-3
57. <input type="checkbox"/>				Digital Data
58. <input type="checkbox"/>				Packet Switched
59. <input type="checkbox"/>				Centrex
60. <input type="checkbox"/>				Central Office Lan
61. <input type="checkbox"/>				Satellite
62. <input type="checkbox"/>				On-Line Information
63. <input type="checkbox"/>				ISDN
64. <input type="checkbox"/>				EMail
65. <input type="checkbox"/>				VSAT

17 Estimated value of networking equipment and services:

- A: Which you helped specify, recommend or approve in the last 12 months?
B: Which you plan to help specify, recommend or approve in the next 12 months?

- | | |
|--|--|
| A | B |
| 1. <input type="checkbox"/> \$100 million and over | 1. <input type="checkbox"/> \$100 million and over |
| 2. <input type="checkbox"/> \$50 - \$99.9 mill. | 2. <input type="checkbox"/> \$50 - \$99.9 mill. |
| 3. <input type="checkbox"/> \$25 - \$49.9 mill. | 3. <input type="checkbox"/> \$25 - \$49.9 mill. |
| 4. <input type="checkbox"/> \$20 - \$24.9 mill. | 4. <input type="checkbox"/> \$20 - \$24.9 mill. |
| 5. <input type="checkbox"/> \$10 - \$19.9 mill. | 5. <input type="checkbox"/> \$10 - \$19.9 mill. |
| 6. <input type="checkbox"/> \$5 - \$9.9 mill. | 6. <input type="checkbox"/> \$5 - \$9.9 mill. |
| 7. <input type="checkbox"/> \$1 - \$4.9 mill. | 7. <input type="checkbox"/> \$1 - \$4.9 mill. |
| 8. <input type="checkbox"/> \$500,000 - \$999,999 | 8. <input type="checkbox"/> \$500,000 - \$999,999 |
| 9. <input type="checkbox"/> Under \$500,000 | 9. <input type="checkbox"/> Under \$500,000 |

18 Estimated gross annual revenue of your entire company/institution: (check one only)

- | | |
|--|--|
| 1. <input type="checkbox"/> over \$10 billion | 5. <input type="checkbox"/> \$50 to \$99.9 mill. |
| 2. <input type="checkbox"/> \$1 to \$9.9 bill. | 6. <input type="checkbox"/> \$10 to \$49.9 mill. |
| 3. <input type="checkbox"/> \$500 to \$1 bill. | 7. <input type="checkbox"/> \$5 to 9.9 mill. |
| 4. <input type="checkbox"/> \$100 to \$499.9 mill. | 8. <input type="checkbox"/> under \$5 mill. |

19 Estimated number of employees for your entire corporation:

- | | |
|---|---|
| 1. <input type="checkbox"/> over 10,000 | 4. <input type="checkbox"/> 1,000 - 2,499 |
| 2. <input type="checkbox"/> 5,000 - 9,999 | 5. <input type="checkbox"/> 500 - 999 |
| 3. <input type="checkbox"/> 2,500 - 4,999 | 6. <input type="checkbox"/> under 500 |

20 Which of the following ISDN products do you plan to purchase in the next 12 months? (check all that apply)

1. ☐ Basic Rate Interface Terminal Adapters
2. ☐ Primary Rate Interface Equipment
3. ☐ Voice/Data terminals
4. ☐ Voice-only terminals
5. ☐ Data-only terminals

21 From which of the following vendors will you consider buying your PBX/Central Office Switch? (check all that apply)

A	PBX	B	COS
	<input type="checkbox"/>		AT&T
	<input type="checkbox"/>		ALCATEL
	<input type="checkbox"/>		ERICSSON
	<input type="checkbox"/>		FWJTSU
	<input type="checkbox"/>		HARRIS
	<input type="checkbox"/>		HITACHI
	<input type="checkbox"/>		ROLM
	<input type="checkbox"/>		INTECOM
	<input type="checkbox"/>		MEMOREX TELEX
	<input type="checkbox"/>		MITEL
	<input type="checkbox"/>		NEC
	<input type="checkbox"/>		NORTHERN TELECOM
	<input type="checkbox"/>		SAMSUNG
	<input type="checkbox"/>		SIEMENS
	<input type="checkbox"/>		STROMBERG-CARLSON
	<input type="checkbox"/>		TOSHIBA
	<input type="checkbox"/>		OTHER

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

An IDG Publication

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

“As routers become cheaper and faster, they will cut into the bridge market. Bridge companies better be careful because there is a trend for routers and routers to replace remote bridges.”

Nina Burns
Principal
Network Marketing Solutions
Palo Alto, Calif.

Netnotes

Sybase, Inc. last week said it will market Network Research Corp.'s Fusion Network Software to provide users of its Sybase relational data base management system with TCP/IP links between dissimilar computers running SQL applications.

The Fusion Network Software will enable Sybase users operating in a Digital Equipment Corp. VAX/VMS environment, for instance, to connect to other computers — including Unix workstations from AT&T, Hewlett-Packard Co. and Sun Microsystems, Inc. — running Sybase SQL applications.

The Fusion Network Software supports Sybase SQL Server and Sybase Open Client TCP/IP for VMS and Unix, Sybase's products for distributing DBMSs and applications over a Transmission Control Protocol/Internet Protocol network.

Internetworking supplier **cisco Systems, Inc.** recently said it has upgraded its AGS+ multiprotocol router to support as many as four Fiber Distributed Data Interface network connections. When it was announced in October 1989, the AGS+ router shipped with support for just two FDDI connections.

According to cisco Systems, pricing for the AGS+ remains unchanged; low-end models start at \$12,300. ■

Health firm to link LANs to TCP/IP net

Seeks to improve data access with software that links LAN servers at three hospitals to backbone.

By Jim Brown
Senior Editor

SILVER SPRING, Md. — Medlantic Health Care Group is planning to expand its TCP/IP backbone network to enable LAN-attached microcomputers to access an IBM mainframe here and a Digital Equipment Corp. VAXcluster at its Washington Hospital Center in Washington, D.C.

The firm, which owns the Washington Hospital Center, as well as the National Rehabilitation Hospital and Capitol Hill Hospital, next month will issue a request for proposal seeking software that will link servers on six 3Com Corp. local-area networks in the Washington Hospital Center to the Transmission Control Protocol/Internet Protocol backbone.

“We’re in the middle of writing the specification now,” said Will Gaud, manager of microcomputer services in Medlantic’s information systems (IS) division, which provides computing and communications services for the

three hospitals.

The TCP/IP network already enables IBM 3270-type terminals in the Washington Hospital Center to access laboratory test results on the VAXcluster and lets VAX-attached DEC VT-320 terminals access administrative data on the IBM host via a 112K bit/sec subchannel on a T-1 network.

That T-1 network supports TCP/IP as well as IBM Systems Network Architecture traffic flowing between the data center, the Capitol Hill Hospital and a campus where the Washington Hospital Center and National Rehabilitation Hospital are located.

Rise in 3Com LANs

While the majority of users at the Washington Hospital Center are linked to an IBM host via 3270 terminals, a growing number of departments are installing 3Com LANs. These LANs enable the departments to create data bases of patient lab results by manually entering test results. It also lets them run microcomput-

(continued on page 52)

Firms join effort for SQL data base compatibility

LONG BEACH, Calif. — The SQL Access Group, a consortium of vendors trying to define a standard method that client applications can use to access heterogeneous SQL data bases, got a boost recently when it signed 10 new members.

Apple Computer, Inc., DB Access, GUPTA Technologies, Inc., Locus Computing Corp., Lotus Development Corp., Micro Decisionware, Microrim, Novell, Inc., Software AG and Sterling Software, Inc. joined the group, raising its ranks to 33 members.

“The SQL Access Group’s membership continues to grow as companies address the issue of data base interoperability in the 1990s,” said Roger Sippl, chairman of the SQL Access Group, in a prepared statement.

One of the major companies still missing from the group’s ranks is IBM, whose presence observers said is mandatory in order to achieve industrywide data interoperability.

Novell became the first inde-

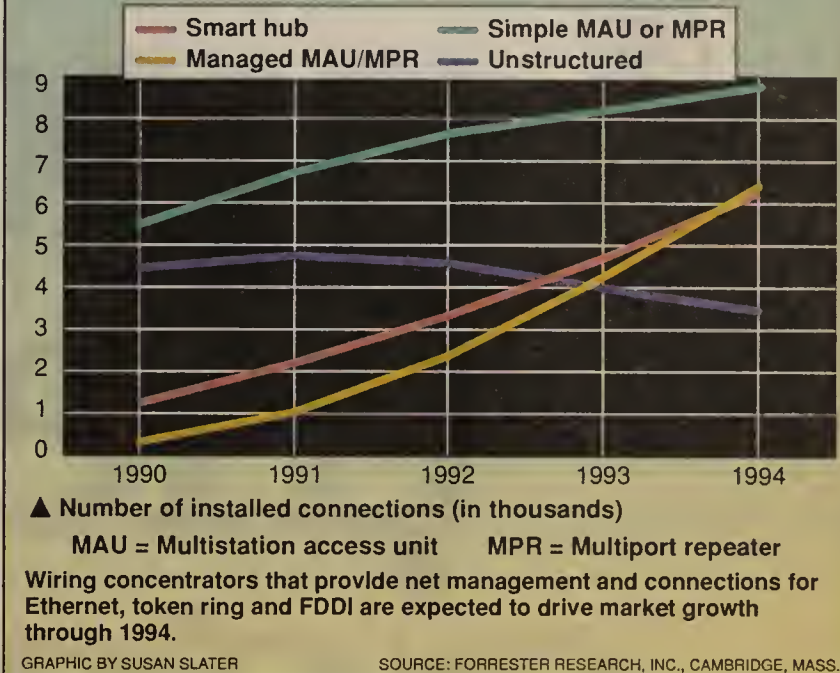
pendent local-area network supplier to join the group, primarily to “leverage off the work existing members have done,” said Dwight Davis, director of product marketing in Novell’s Development Products Group in Austin, Texas, which is responsible for the company’s data base offerings.

“We’re pretty comfortable that the members they have in place can do the job, and we want to be in position to take advantage of their success,” Davis said. Novell joined as an observer member, in effect forfeiting voting rights.

Davis said Novell’s decision to join the group does not mean the LAN software giant will support the technology generated by the group’s effort.

“We haven’t said we’d do that now,” Davis said. “We may have some problems with what’s finally presented in the end, but our interest indicates there’s a strong possibility we’ll embrace the effort.” ■

Future bright for LAN hubbing device market



Need for network control driving smart hub market

Sales of manageable devices to ramp up quickly.

CAMBRIDGE, Mass. — The use of smart local-area network hubs is expected to flourish through 1994, thanks in part to the arrival of smart concentrators for token-ring networks and the advent of FDDI, according to a new report from Forrester Research, Inc.

“The market is still very technology-driven and will remain so through 1991, after which we will

smart hubs. Traditionally, MAUs and MPRs were simply passive devices.

Smart token-ring MAUs will, in fact, contribute significantly to the growth of the overall industry. For example, IBM’s new Controlled Access Unit, a managed MAU, will stimulate demand for managed connections for token ring and offer smart hub vendors their toughest competition to date, Modahl said.

These new devices will not, however, support routing or enable users to support both Ethernet and token-ring LANs from the same box. The latter could be a limiting factor in that 70% of the Fortune 1,000 companies have mixed Ethernet and token-ring LAN environments, she said.

Vendors of traditional smart hubs have a few technical strengths to lean back on.

see more price competition,” said Mary Modahl, director of Network Strategy Research at Forrester, a research firm based here.

The report, “Smart Hub Update,” stated that vendors of traditional intelligent wiring concentrators — such as Cabletron Systems, Inc., SynOptics Communications, Inc. and Ungermann-Bass, Inc. — will face new competition from systems players such as IBM and Digital Equipment Corp.

IBM and DEC are creating a new market segment by introducing, respectively, smart multistation access units (MAU) for token-ring networks and multiport repeaters (MPR) for Ethernets, devices that offer the network management capabilities of

there have backplane designs that can accommodate migration to 100M bit/sec Fiber Distributed Data Interface technology. Modahl said vendors will take advantage of this by introducing FDDI hubbing components this year.

Although the demand for FDDI products won’t ramp up until 1993, shorter term revenue gain will be provided by another technical advantage of chassis-type smart hubs — the ability to add internal bridges and routers to the devices.

The main trend here is that hubbing devices providing network management will eventually eclipse passive MAUs and MPRs, as well as what Forrester calls unstructured LANs, networks based on simple wire links. ■

**Announcing
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event
in network
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server crash.**

Irwin, the industry leader in tape backup, makes network news with the introduction of the most powerful and comprehensive package of backup software in the industry.

Irwin EzARC™ software gives Novell Netware users both central-workstation and client-server LAN backup.

Irwin EzTape/MAP™ software gives you the ability to back up from any workstation on your LAN, and provides peer-to-peer resource sharing.

Then there's Irwin EzTape® software, the world's most popular software for backup. When installed on a network workstation, it can back up the server and the local hard disk.

Along with this powerful trio of software solutions are equally powerful, new tape drives.

Our new 4 millimeter internal or external DAT drives back up 1.3 gigabytes.

And an 8 millimeter external system



CAPACITY		
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SCSI HOST ADAPTER		
AT Bus		MC Bus
SOFTWARE		
Networked Workstation EzTape		
NOVELL NETWARE 286 & 386		
Peer-to-Peer Workstation EzTape/MAP	True Server-Based EzARC 286-VAP EzARC 386 NLM	

No matter how your network is configured, Irwin can provide you with the hardware and software solutions you need for high-speed, high-capacity backup.

backs up a whopping 2.3 gigabytes.

Whether you're managing Novell Advanced Netware, LAN Manager, 3 COM 3+, IBM Token Ring, or DOS Net BIOS-compatible networks, these new hardware and software tools give you a complete network backup solution. From the server to the desktop.

Novell-certified, EzARC allows you to back up every volume on the network. Right from the server.

Eliminating the need for an intermediary LAN workstation between the server and the tape drive.

Which means data transfers at the tape drive's maximum speed.

In addition to faster backup, EzARC also enhances network performance. Because it doesn't increase network traffic.



And it boosts your personal productivity. Because your workstation is free to run other applications during backup.

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Which is why EzARC is designed to automatically duplicate file servers. Without user intervention.

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And the next time your server crashes, it won't be such a big event.

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See The FAXNet Form on Page 26



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Fiber Perspectives '91

Featuring Forum and Exhibits for Managing Transitions

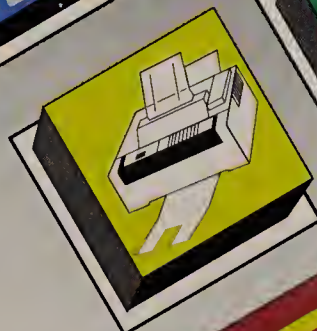
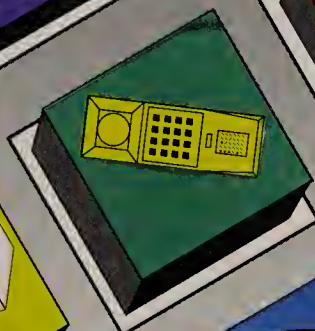
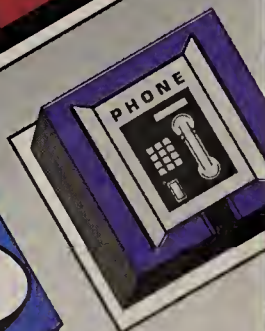
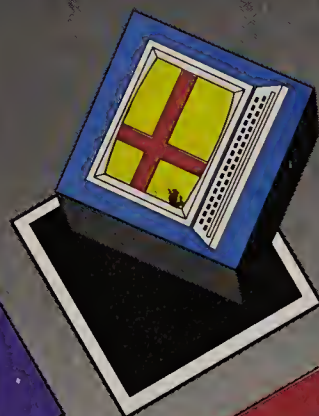


Gateways to KnowledgeSM

SUPERCOMM '91
International
Conference and
Exhibition

March 18-21, 1991

George R. Brown
Convention Center
Houston, Texas





SUPERCOMM '91 International Conference and Exhibition

March 18-21, 1991

**George R. Brown
Convention Center
Houston, Texas**

The SUPERCOMM® '91 International Conference and Exhibition opens your gateways ... to knowledge ... to opportunities ... to the future. As the most extensive business and technical look at today's fast-changing industry, SUPERCOMM '91 brings you more seminars, panels, exhibits, tutorials and special presentations than any other annual telecommunications event in the world. This year's SUPERCOMM features 52 free sessions and nearly 500,000 square feet of free exhibits from today's leaders in technology.

Southwestern Bell is featuring its customized display "Horizons" ... unique telecommunications applications designed specifically for the fields of health care and education. Such applications as medical imaging and medicinal consultation in health care, and distance learning and PC-to-PC networking in education are already being used in the field today.

Plus, we've added another first: The all-new "Fiber Perspectives '91" - Featuring Forum and Exhibits for Managing Transitions. Keynote luncheons will open each day's program Tuesday through Thursday, followed by three simultaneous tracks and a dozen breakout sessions on fiber optics and outside plant.

We're also welcoming several new international neighbors to the SUPERCOMM roster: the Pacific Telecommunications Council (PTC), Caribbean Telecommunications Council (CTC) and a 100-person delegation representing the Association of Telephone Companies in Finland.

On Tuesday, you can find out firsthand what's shaping telecommunications in the Pacific Rim from the PTC. Based in Honolulu, the Council brings a day-long program covering activities and developments in Asia-Pacific telecommunications, focusing on facilities, services, and its markets. Wednesday, the CTC is sponsoring a conference on international investment and cellular in rural applications in its region, as well as disaster recovery and international marketing.

Come to SUPERCOMM '91 and survey thousands of products and services. Get up-to-date facts on technical, operational, and management issues. Share your knowledge and expertise with more than 15,000 industry professionals from the U.S. and around the world, including nearly 500 exhibiting companies. Every branch of the telecommunications industry will be participating. Don't miss out!

Highlights for the Industry Event of 1991.

What to see. What to do. It's a challenge. Especially when you consider that SUPERCOMM '91 offers the broadest series of program sessions in the industry, as well as the world's largest annual telecommunications exhibition. To get you started, we've mapped out some points of interest you'll want to include when planning your itinerary.

**500,000 Square Feet of Free
Exhibits Tuesday to Thursday
— No Exhibits Monday.**

SUPERCOMM's track record is

going strong. For the fourth year in a row, exhibit space has grown dramatically and it's selling out earlier than ever!

Tuesday through Thursday, you can walk through almost 500,000 square feet of high-tech displays and hands-on demonstrations. Nearly 500 free exhibits in all!

Three Valuable Presentations, All Free.



Tuesday, FCC
Chairman Al Sikes will open with his keynote address on telecommunications in a changing world.

Wednesday, Northern Telecom will open with a presentation on its view of the future trends and directions in telecommunications, including the move to fiber and wireless technologies. The program will review global activities affecting the public network and the speed with which new features are delivered to customers whose needs are rapidly changing.



Thursday, official publishers *Telephony* and *Network World* will host a panel discussion on local and interexchange carrier issues. Moderator: *Network World* Publisher Gary Beach.

Who We Are:



Based in Washington, D.C., USTA represents approximately 1,100 local exchange telephone companies throughout the United States.



With over 600 members, TIA is the largest association in the United States representing manufacturers and suppliers of telecommunications equipment and services. TIA has offices in Chicago and Washington, D.C.

Attend Seminars and Lectures Monday through Thursday.

SUPERCOMM '91 is offering 52 free sessions over four solid days. Plus, three-hour tutorials Monday at \$75 each on ISDN and wireless. And moderately priced conferences organized by the Pacific Telecommunications Council and the Caribbean Telecommunications Council on Tuesday and Wednesday.

Monday's Your Primer for the Week.

Morning and afternoon primers will cover everything from telecommunications buzzwords and fiber optics to ISDN and LANs/MANs. These four primers are free and you can't afford to miss even one to help you prepare for the rest of the week's sessions.

Spotlighting Industry Experts.

Find out what the industry's experts have to say by attending three afternoon spotlight panels.

Monday, it's "Telecommunications Research" hosted by Allen R. "Mike" Frischkorn, President of TIA.

Tuesday, it's "End Users and Local Carriers" moderated by USTA President John Sodolski, with participants from the Boards of the International Communications Association and USTA.

Wednesday, enjoy "New Horizons for Telecommunications in Education," a discussion of applications and opportunities, hosted by Southwestern Bell.

Insight from SUPERCOMM '91 Co-Sponsors USTA and TIA.

This year's focus is on a multitude of telecommunications issues to educate and generate ideas on two different educational levels. The first level includes comprehensive technical and non-technical seminars, practical applications-oriented programming sessions – all free from SUPERCOMM '91.

The second level includes a new addition to our roster: "Fiber Perspectives '91" – Featuring Forum and Exhibits for Managing Transitions and co-sponsored with *Telephony*. Tuesday and Wednesday, starting with a luncheon address, there will be two rounds of simultaneous sessions in three tracks. And on Thursday, a wrap-up session and luncheon address to conclude the conference. It promises to be one of the most informative and exciting parts of this year's event, so don't miss it. Pre-registration by February 15 for Fiber Perspectives '91 is **\$295**. On-site registration is **\$395**.

Sharing Know-How on Asia-Pacific Telecommunications.

The Asia-Pacific Region is a hot spot for telecommunications. Mass

development of new services is under way. Basic and advanced facilities are multiplying. And the increased interest in informational services is nothing less than phenomenal.

On Tuesday, learn first-hand what is taking place in the Asia-Pacific Region. Hosted by the Pacific Telecommunications Council, the day-long conference will begin with an overview by a panel of speakers from five countries.

Next, it's on to outlining existing and planned information services. Luncheon speaker Dr. Meheroo Jussawalla, Research Associate/Economist of the East-West Center in Honolulu, Hawaii, will address the current state of the region's economy and politics. The afternoon panel focuses on market potential, access and selling abroad.

Finally, it's the globalization of telecommunications. A speaker from an RBOC and others will tell us how joint ventures and strategic alliances are affecting and meeting the needs of our changing world.

What's New in Caribbean Telecommunications?

Find out Wednesday at a special, one-day conference sponsored by the Caribbean Telecommunications Council. The CTC conference will focus on such topics as Disaster Recovery Using Satellites and International Marketing, including Yellow Pages directories. A panel will discuss the financial and technical aspects of Cellular in Rural Applications for Latin America, as well as fixed cellular. And a demonstration will be given on Outside Plant Computer Graphics.

Registration Form for the Asia-Pacific and Caribbean Conferences

Name ☐ Mr. ☐ Ms. ☐ Dr. _____
Title _____
Company/Organization _____
Address _____ Room #/MS/Suite _____
City _____ State/Province _____
Postal Code _____ Country _____
Telephone _____ FAX _____ TELEX _____

Registration fee of \$125 for each conference includes luncheon and seminar materials. Space will be limited, early registration is recommended. Please note: Duplicate this form for each conference. Fill out and **mail separately** to addresses for PTC and/or CTC.

☐ Payment Enclosed ☐ Purchase Order Enclosed
☐ VISA ☐ MasterCard ☐ American Express
Cardholder's Signature _____
Account No. _____ Exp. Date _____

For PTC Conference, mail form and payment to:

Pacific Telecommunications Council
1110 University Ave., Suite 308
Honolulu, HI 96826 USA

Telephone: 1-808-941-3789
Facsimile: 1-808-944-4874

For CTC Conference, mail form and payment to:

Caribbean Telecommunications Council
c/o AT&T
954 Ponce de Leon Ave., 6th Floor
Santurce, PR 00907

Telephone: 1-809-729-2742
Facsimile: 1-809-725-6624

Note: No refunds after February 15, 1991.

SUPERCOMM '91 At-A-Glance

	Monday Exhibits Closed	Tuesday Exhibits Open 10-5	Wednesday Exhibits Open 9-5	Thursday Exhibits Open 9-3
8:30-		Continental Breakfast	Continental Breakfast	Continental Breakfast
9:00-				
9:30-		Opening General Session FCC Chairman Al Sikes Keynote Address	Second General Session Northern Telecom Presentation	Third General Session <i>Telephony/ Network World</i>
10:00-	Primer: 1 MG Telecom "Buzzwords"			
10:15-	Seminars: 2 SI Europe '92 3 OP Operational Support Systems 4 TE Advanced Intelligent Network			
10:45-				
11:00-	Primer: 5 TE Fiber Optics Seminars: 6 SI Eastern Europe 7 MG Network Manage- ment Control 8 TE Open Network Architecture	Seminars: 17 TE SONET - Basics 18 TE ISDN 19 MG National Services Coordination for Small Telcos 20 MK Marketing New Services 21 TE Gigabit Net Testbeds 22 TE Numbering Issues	Seminars: 29 TE SONET - Applications 30 SI Customer Premises Equipment 31 PO Advanced Infra- structure Issues for Small Telcos 32 MK 800 - 900 Issues 33 MG Billing 34 TE Voice Processing	Seminars: 41 OP SS7 Update 42 MK Houston Users' Roundtable 43 MG Digital Cross Connects 44 MK New Product Development 45 OP Satellites 46 MK Facsimile
11:30-				
12:00-		"Fiber Perspectives '91" Lunch/Lecture (see Fiber Perspectives session choices on opposite page)	"Fiber Perspectives '91" Lunch/Lecture (see Fiber Perspectives session choices on opposite page)	"Fiber Perspectives '91" Lunch/Lecture and Wrap-up Panel (see Fiber Perspectives session choices on opposite page)
12:15-				
1:00-				
1:30-	Spotlight Panel: Telecom Research TIA Host	Spotlight Panel: Local Carriers/End Users USTA Host with ICA	Spotlight Panel: New Horizons for Telecom in Education Southwestern Bell Host	
2:30-				
2:45-	Primer: 9 TE ISDN Seminars: 10 SI Mexico/Brazil 11 TE Fiber 12 PO Infrastructure Development - Legislation	Seminars: 23 MG Wireless-I 24 TE LAN Interconnection 25 PO Infrastructure Development - Regulatory 26 MK Operator Services 27 MG Videoconferencing 28 OP EDI, EFT and Bar Coding	Seminars: 35 MG Wireless-II 36 TE Broadband 37 TE Network Design/ Planning 38 MK Centrex 39 OP Videotex Gateway 40 TE SMDS - Update	
4:00-				
4:15-	Primer: 13 TE LANs/MANs Seminars: 14 OP End User Network Management 15 MG Network Reliability 16 PO Infrastructure Develop- ment - Judicial			
5:30-				

*TUTORIAL - ISDN TE

*TUTORIAL - WIRELESS TE

ASIA-PACIFIC TELECOMMUNICATIONS CONFERENCE (see registration form on page 3)

CARIBBEAN TELECOMMUNICATIONS CONFERENCE (see registration form on page 3)

Planning Information

To assist in your seminar selections, we've divided SUPERCOMM '91 sessions into six categories:

- TE** - Technical
- OP** - Operational
- MK** - Marketing
- MG** - Management
- PO** - Policy
- SI** - Special Interest

Please respond to our survey on sessions you're likely to attend. Use the coupon on page 7, or simply mark up this schedule and mail a photocopy. Thank You!

*see registration form on opposite page

Note: Schedule subject to change

Fiber Perspectives '91

Co-sponsored by USTA, TIA and Telephony

Featuring Forum and Exhibits for Managing Transitions

When you attend "Fiber Perspectives '91," you'll get a glimpse of the future. This all-new addition to SUPERCOMM '91 is an instant attention-getter. The conference includes three tracks with a total of twelve sessions.

The first track, **Technology & Product Trends**, will focus on such topics as *The Digital Loop Carrier Revolution*, *Beyond Digital Cross Connects*, *Video Services - Now*, and *Passive and Active Optical Networks*.

The second track, **Marketing & Management**, features one double and three single sessions. For openers *Economic Opportunities and Constraints*, and *Craftspeople & the Network of the 90's*. Session two features *Managing the Transition from Copper to Fiber* - a must for telcos. Plus, *Fiber Competition: The New Carriers* and *Applications and Drivers - Fiber in the Loop*.

The third track focuses on **OSP Strategies for the Future**, beginning with the first session entitled *Power Strategies for the Local Loop*. Its discussions include *Issues Affecting Today's Powering Strategies*, *The Vendor Perspective*, and *The Carrier Perspective*. The second session is *Fiber Restoration with Texas A&M*. And the third session will be *The Economics of Fiber: New Growth Areas & Rehab*. Then a repeat of the Texas A&M presentation.

A Distinguished Group of Keynote Speakers.

Tuesday launches the beginning of Fiber Perspectives '91 with luncheon speech by Greg Hughes, President, AT&T's Network Cable Systems.

Wednesday, the luncheon address will be given by Royce Holland, President, Metropolitan Fiber Systems.

Thursday concludes with speech and wrap-up panel by Richard Snelling, Executive VP-Network, Southern Bell.

Pre-register Now and Save \$100.

Sign up now for just \$295. On-site registration is \$395. Seating will be limited, so make your reservation today!

Tuesday	
11:30-1:00	Lunch/Address Greg Hughes, Pres. AT&T's Network Cable Systems
1:00-2:30	Choose one: First Sessions A1 B1 C1
2:45-4:15	Choose one: Second Sessions A2 B2 C2

Wednesday	
11:30-1:00	Lunch/Address Royce Holland, Pres. Metropolitan Fiber Systems
1:00-2:30	Choose one: First Sessions A3 B3 C3
2:45-4:15	Choose one: Second Sessions A4 B4 C4

Thursday	
11:30-1:30	Lunch/Address and Wrap-up Session Richard Snelling, Exec. Vice Pres. - Network, Southern Bell
3:00	Exhibits Close

Topics for Three Tracks

Technology and Product Trends

- A1** The Digital Loop Carrier Revolution
- A2** Beyond Digital Cross Connects
- A3** Video Services - Now
- A4** Passive and Active Optical Networks

Marketing and Management

- B1** Economic Opportunities and Constraints/Craftspeople & the Network of the 90's
- B2** Managing the Transition from Copper to Fiber
- B3** Fiber Competition: The New Carriers
- B4** Applications and Drivers - Fiber in the Loop

OSP Strategies for the Future

- C1** Power Strategies for the Local Loop
- C2** Fiber Restoration with Texas A&M
- C3** The Economics of Fiber: New Growth Areas & Rehab
- C4** Fiber Restoration with Texas A&M

Registration Form for Fiber Perspectives '91 and/or SUPERCOMM Tutorials

Registration fee for Tutorials \$75 each <input type="checkbox"/> ISDN Mon. - 9 am-12 noon \$ _____ <input type="checkbox"/> Wireless Communications Mon. - 1pm - 4 pm \$ _____ Total \$ _____	<input type="checkbox"/> Payment Enclosed (check made payable to TIA). <input type="checkbox"/> Purchase Order Enclosed <input type="checkbox"/> VISA <input type="checkbox"/> MasterCard <input type="checkbox"/> American Express Cardholder's Signature _____ Account No. _____ Exp. Date _____
Registration fee for Fiber Perspectives '91 <input type="checkbox"/> \$295 Before Feb. 15 \$ _____ <input type="checkbox"/> \$395 After Feb. 15 \$ _____ Space is limited. Register early! (Includes luncheons Tuesday, Wednesday and Thursday, seminars and all materials.)	TOTAL amount enclosed \$ _____ Note: No refunds after February 15, 1991.

Name ☐ Mr. ☐ Ms. ☐ Dr. _____

Title _____

Company/Organization _____

Address _____ Room #/MS/Suite _____

City _____ State/Province _____

Postal Code _____ Country _____

Telephone _____ FAX _____ TELEX _____

Mail to: Telecommunications Industry Assn., 150 N. Michigan Ave., Suite 600
Chicago, IL 60601 Telephone: (312) 782-8597 FAX: (312) 782-3617

Housing and Registration Information

Get the Industry Edge

Fill out this registration and housing form today for SUPERCOMM '91. All forms will be mailed to Rogal America (address on page 7). To handle housing questions on-site, Rogal will have a booth located in the Registration Area of the George R. Brown Convention Center.

Housing

A portion of each hotel's room block has been set aside for attendees. At the Hyatt Regency Houston, no more than 15 rooms will be allotted to any one company. At the Four Seasons Hotel, no more than 10 rooms will be allotted to any one company.

Hotel Deposits

A hotel deposit is required for each hotel room/suite requested. The deposit must be submitted with the Official Housing/Registration Form. Forms are date stamped and processed on a first-

come, first-serve basis. All rooms must have a deposit in the amount of one night's lodging. The deposit may be in the form of a major credit card or a check payable to "Rogal America, Inc." (except where noted under Hotel Information).

Hotel Confirmations/Changes

Hotel reservation acknowledgments will be sent directly to you from Rogal. Any hotel changes, substitutions, or cancellations must be made directly through Rogal. Do not contact the hotels directly. Hotel cancellations can be made by mail, FAX 617/965-2729 or Telex 413053 ROGALAM, or call 617/965-8000 or 1-800-553-0505.

Badges

Badges will be mailed (USA only), so provide the correct mailing address for EACH registrant. You will receive your badge approximately 2 weeks prior to the show. If you do not receive your badge, please register on-site.

Foreign and Canadian badges will not be mailed. A special booth will be provided for pick-up of these badges in the Registration Area of the George R. Brown Convention Center.

Missed Deadline

Forms received after the SUPERCOMM '91 deadline of February 15, 1991 will be handled in two ways:

HOUSING: Rooms will be assigned on a space available basis.

SHOW REGISTRATION: Registrants whose forms are received after the deadline will be asked to register on-site.

Shuttle Bus

Shuttle Bus service will be provided between all SUPERCOMM '91 hotels and the George R. Brown Convention Center on March 18-21, 1991.

#	Hotel Information	# of Units	One Person	Two Person
1	* Allen Park Inn 2121 Allen Parkway	100	\$ 62	\$ 70
2	Days Inn Downtown 801 Calhoun	200	\$ 75	\$ 80
3	** Doubletree, Allen Center 400 Dallas St.	225	\$104	\$119
4	Doubletree, Post Oak 2001 Post Oak Blvd.	250	\$105	\$115
5	Four Seasons Hotel 1300 Lamar St.	250	\$120 \$135 \$160	\$140 \$155 \$185
6	Grand Hotel 2525 W. Loop South	200	\$ 70	\$ 80
7	Guest Quarters 5353 Westheimer Rd.	175	\$109	\$109
8	Holiday Inn, Astrodome 8111 Kirby Drive	150	\$ 68	\$ 78
9	Holiday Inn Crowne Plaza 2222 W. Loop South	350	\$ 90	\$ 98
10	Holiday Inn Galleria 3131 W. Loop South	250	\$ 65	\$ 65
11	Holiday Inn Greenway Plaza 2712 Southwest Fwy.	225	\$ 76	\$ 86
12	Hotel Luxeford Suites 1400 Old Spanish Trail	125	\$ 67	\$ 77
13	Houston Marriott, Astrodome 2100 S. Braeswood Dr.	250	\$ 85	\$ 95
14	The Houstonian Hotel 111 N. Post Oak Lane	100	\$120	\$130

#	Hotel Information	# of Units	One Person	Two Person
15	Hyatt Regency Houston 1200 Louisiana St.	750	\$120	\$135
16	Inn on the Park Four Riverway	225	\$150	\$180
17	J.W. Marriott Houston Galleria 5150 Westheimer	350	\$105	\$115
18	The Lancaster Hotel 701 Texas Ave.	34	\$145	\$145
19	Marriott, West Loop 1750 W. Loop South	150	\$118	\$118
20	Quality Inn-Greenway Plaza 4020 Southwest Fwy.	150	\$ 50	\$ 60
21	Ramada Inn-Greenway Plaza 2929 Southwest Fwy.	150	\$ 45	\$ 45
22	Residence Inn 7710 S. Main Street	100	\$ 75	\$ 75
23	The Ritz-Carlton 1919 Briar Oaks Lane	125	\$122	\$137
24	Sheraton Astrodome Hotels 2350 S. Loop West	600	\$ 68	\$ 78
25	* Stouffer Presidente 6 Greenway Plaza East	250	\$103	\$115
26	Travelodge Viscount 2828 Southwest Fwy.	150	\$52	\$ 62
27	Westin Galleria Westin Oaks 5060 W. Alabama	400 300	\$120 \$120	\$130 \$130
28	Wyndham Warwick 5701 Main Street	175	\$ 99	\$109

* Accepts ONLY check or money order as 1st night deposit.

** Accepts ONLY American Express or check/money order as 1st night deposit.

Note: Due to the wide range of suite types, please call Rogal 1-800-553-0505 or 617-965-8000.

Advance Registration/Housing Request Form

1. Check ONE category that best describes your **INDUSTRY AFFILIATION** (Also enter on line 3e).

Exchange Carriers/Subsidiaries

- 10 ☐ Bell Holding Companies
- 11 ☐ Bell Operating Companies
- 12 ☐ Independent Holding Companies
- 13 ☐ Independent Operating Companies
- 14 ☐ Foreign Telcos

Non-Operating Telco Subsidiaries

- 15 ☐ Bell
- 16 ☐ Independent

Other Carriers

- 17 ☐ Long Distance
- 18 ☐ International
- 19 ☐ Mobile/Cellular
- 20 ☐ CATV/Radio/TV

Other Telecom Providers

- 21 ☐ Telecom Manufacturers
- 22 ☐ Dealers & Distributors
- 23 ☐ Contractors & Electrical Services
- 24 ☐ Consultants & Architects
- 25 ☐ Financial & Leasing Companies
- 26 ☐ Data Communications Equipment Manufacturers
- 27 ☐ Data Communications Services
- 28 ☐ Telecommunications Associations

Telecom Users

- 29 ☐ Educational
- 30 ☐ Financial/Investment
- 31 ☐ Hospitals/Health Care
- 32 ☐ Hotel/Motel
- 33 ☐ Legal/Insurance/Real Estate
- 34 ☐ Publishing
- 37 ☐ Research & Development
- 38 ☐ Stadiums/Convention Centers
- 39 ☐ Trade (Retail/Wholesale)
- 40 ☐ Transportation/Pipelines
- 41 ☐ Utilities (Gas/Water/Electric)

Government

- 42 ☐ Government/Regulatory
- 43 ☐ Military
- 44 ☐ Foreign

Other

- 46 ☐ Press
- 50 ☐ Spouse/Child (non-industry)
- 51 ☐ Other (please specify) _____

2. Check ONE that best describes your **professional responsibility** (also enter on line 3e).

- A ☐ Corporate/Administrative
- B ☐ Sales/Mkt./Customer Services
- C ☐ Human Resources
- D ☐ Engineering
- E ☐ Network Operations
- F ☐ Research & Development
- G ☐ Central Office
- H ☐ Transmission
- I ☐ Cable & Wire
- J ☐ Voice/Data Mgmt.
- K ☐ Mobile/Cellular Comm.
- L ☐ Support Services
- M ☐ Fiber Optic Operations
- N ☐ Other (please specify) _____

Please make copies if necessary.
Mail completed registration form(s) to:

Rogal America, Inc.
SUPERCOMM '91
313 Washington Street, Suite 300
Newton Corner, MA 02158

Conference Dates:
March 18-21, 1991

Exhibit Dates:
March 19-21, 1991

Pre-Registration Deadline:
February 15, 1991

3. Registration and/or Housing Reservation.

Whether or not you use hotel accommodations, please fill in to pre-register.
Please print.

a. Name _____
Last First (no initials) Nickname for badge

b. Title/Department _____

c. Company _____

d. Address _____ Room #/MS/Suite _____

City _____ State _____ Zip _____

Telephone () _____ FAX () _____

e. Industry Affiliation _____ Professional Responsibility _____
(Use number from #1) (Use letter from #2)

f. HOTEL PREFERENCE: 1st _____
2nd _____ 3rd _____

If your hotel choices are not available, please check how your choice was made:

☐ Rate ☐ Location

All your rooms must have a guarantee in the amount of one night's lodgings. You may guarantee your room with a major credit card or a check payable to "Rogal America, Inc." (except where noted under Hotel Information).

g. Hotel Room Type Requested _____

h. Arrival Date _____ Departure Date _____

i. Name of Second Occupant _____
(Complete a registration form for this person.)

j. Payment by: ☐ check ☐ Visa ☐ MasterCard ☐ American Express

Credit Card # _____ Card Exp. Date _____

Signature _____

Or, I have enclosed my check for \$ _____ as deposit for first night's lodging.
If you are a member of the hotel frequent traveler club, please indicate your hotel chain and card number.

Hotel Chain _____ Card Number _____

k. Hotel Not Required ☐

REGISTRATION FORMS:

To register for the following events, refer to the page indicated. "Fiber Perspectives '91" - pg. 5; SUPERCOMM '91 Tutorials - pg. 5; Pacific Telecommunications Conference - pg. 3; Caribbean Telecommunications Conference - pg. 3.

Help Us Help You

We'd like to make your comfort our priority, by scheduling room sizes based on session popularity. Please fill in the number of the SUPERCOMM '91 Primers/Seminars and/or check off any other events you plan to attend. Return to Henry Wieland, Executive Director - Special Events, USTA, 900 19th Street, N.W., Suite 800, Washington, D.C. USA, 20006-2190. Thank You!

Please write the number of each Primer/
Seminar you plan to attend:

General Sessions:

☐ Tues. ☐ Wed. ☐ Thurs.

Spotlight Panels:

☐ Mon. ☐ Tues. ☐ Wed.

Tutorials:

☐ ISDN ☐ Wireless Communications

☐ PTC Conference ☐ CTC Conference

Fiber Perspectives '91:

Lunch/Lecture: ☐ Tues. ☐ Wed. ☐ Thurs.

Sessions: **A1 A2 A3 A4**
(circle)

B1 B2 B3 B4

C1 C2 C3 C4

Houston: A World-Class Experience

Deep in the heart of every Texan, pride is on the up and up. Texans cater to visitors in a big way. But that's not unusual. They do everything in a big way. Houston's beautiful new George R. Brown Convention Center is a perfect example. So are the fine hotels throughout the city.

Culturally, Houston is one of only four U. S. cities to have its own company in each of the performing arts. The Museum of Fine Arts is one of the country's most outstanding art institutions. A permanent collection includes Van Gogh's *The Rocks* and Rogier van der Weyden's *Virgin and Child*.



The nightlife's downright exciting. Sophisticated dinner and comedy clubs abound. The music scene includes everything from cool jazz to country & western to rock 'n roll.

There are bronco-busting Texas rodeos, historic tours, Six Flags Amusement Park, NASA's Manned Space Flight Center, and, for shopping, the famous Galleria Mall. And there's

nothing better this side of heaven than the food you'll find in Houston's restaurants.

Texas. The West was won here. Now it's out to win your heart in Houston at SUPERCOMM '91.

Discount Airline and Car Rental Information

Delta Air Lines
Acct. No. U0537
1-800-241-6760
8am - 8pm EST
7 days a week

American Airlines
Star #S0331KF
1-800-433-1790
7am - Midnight CST
7 days a week

Alamo® Rent A Car
ID #64033
Plan Code "G3"
Call 1-800-732-3232

Sweepstakes tickets for two to any American Airlines' European destination. Tickets will be awarded to an attendee during SUPERCOMM who used American Meeting Services desk. (Certain black-out periods apply.)



For Programming:



900 19th Street, N.W.
Suite 800
Washington, D.C. USA 20006-2190
Phone: (202) 835-3100
Fax: (202) 835-3248

To Exhibit:



150 N. Michigan Avenue
Suite 600
Chicago, IL USA 60601-7524
Phone: (312) 782-8597
Fax: (312) 782-3617
Telex: 595236 USTSACGO

**SUPERCOMM '91 thanks
Telephony and Network
World, official publishers
of these events. Watch for
other brochures inserted
in January issues.**

Telephony



900 19th Street, N.W.
Suite 800
Washington, D.C. USA 20006-2190

MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

Worth Noting

“Ultimately, the market will take over and those companies that don’t keep up with the latest advances in information technology will be left in the dust.”

Cheryl Currid
Director of applied
information technology
Coca-Cola Foods
Houston

Association Watch

The **Network Analysis Users Group (NAUG)** will hold its annual conference for users of Network General Corp.’s Sniffer Network Analyzer from April 1 to 5 at the Marriott Mark Resort in Vail, Colo.

The focus of the conference will be on issues relating to network troubleshooting and optimizing a net’s performance. Seminars will cover topics ranging from connecting Ethernet and token-ring networks to benchmarking, troubleshooting and protocol analysis. NAUG is asking for solution papers from users that detail real-world network problems and the techniques used to resolve them. Proposals are due by Jan. 31.

The conference costs \$600 for attendees who register before Feb. 15 and \$800 for those who register after that date. For more information, call (415) 688-2700.

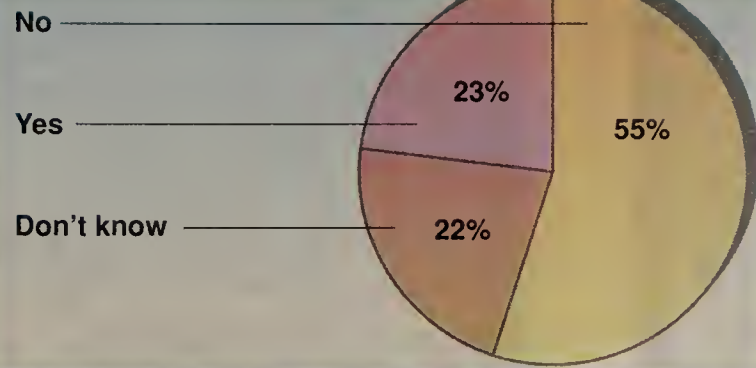
A new association of long-distance carrier resellers was recently formed to further the interests of companies involved in this evolving subsegment of the long-distance market.

Called the **Telecommunications Marketing Association**, the group will focus on exploring methods of improving resellers’ relationships with carriers, particularly AT&T. Other issues will include state certification, reg-

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Evaluating EDI

Did your company conduct a cost/benefit analysis of EDI prior to implementation?



Figures are based on a survey conducted last June of 600 International Customer Service Association member companies.

SOURCE: INTERNATIONAL CUSTOMER SERVICE ASSOCIATION, CHICAGO
GRAPHIC BY SUSAN J. CHAMPENY

Network gives police ready access to an array of data

Nevada police get new weapon in war on crime.

By Maureen Molloy
Staff Writer

CARSON CITY, Nev. — Nevada has recently enhanced its state police network here to enable officers on the road to tap into local, state and federal criminal justice data bases in as few as 10 seconds.

Deployment of a central store-and-forward message switching system — dubbed the Law Enforcement Message Switching

Previously, users had to access 17 data bases in the state to obtain information.

▲▲▲

(LEMS) system — is enabling law enforcement officers across the state to quickly access warrant and other criminal information maintained by a variety of agencies with a single request.

Previously, users had to access 17 data bases throughout the state to obtain such information.

How it works

LEMS takes requests for information and routes them to the appropriate data sources, speeding up the investigative process.

The implementation of LEMS and the upgrading of host processors supporting the Nevada Highway Patrol Network has allowed the net to support a much higher volume of transactions than in the past, according to Alan Rogers, data processing manager for

the Nevada Highway Patrol Network.

“Speed and flexibility are essential in catching criminals,” Rogers said. “With this system, an officer on patrol in his car can access information in seconds regarding any vehicle he may have stopped for any routine violation or traffic check. Three of the country’s most wanted criminals were recently apprehended in Nevada, with much of the credit for the collars attributed to LEMS.”

A rapidly expanding economy during the 1980s led to a corresponding increase in Nevada’s crime rate, causing an explosion in demand for criminal information processing capabilities. By 1986, the state’s Highway Patrol Network was handling 35,500 transactions per day, which swamped computer systems and left users so dissatisfied that they simply stopped using the network, Rogers said.

LEMS routes requests to the data sources, speeding up the investigative process.

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The state recently upgraded from a Unisys Corp. 1100/72 host to dual Unisys 2200/401 mainframes in order to handle the increased information processing requirements.

The LEMS application was also

(continued on page 25)

Panel mulls perils of pitching net projects

User Advisory Panel says managers must sell the soft benefits of network investments to top execs.

By Maureen Molloy
Staff Writer

Members of **Network World’s** User Advisory Panel say many senior executives are resistant to long-term strategic network projects that cannot be justified on the grounds of cost savings.

Therefore, the onus is on network managers to hone their abil-

ity to demonstrate the soft-dollar benefits — such as improved corporate image and productivity or increased customer loyalty — of major network expenditures.

“With some projects, it’s difficult to do a classic return on investment, but it isn’t hard to give a business benefits case,” said Laurie Bride, manager of network architecture at Boeing Computer Services Co. in Seattle.

Bride is a member of **Network World’s** User Advisory Panel, which comprises representatives of leading user groups as well as top network executives from companies in a range of industries.

Boeing’s strategic network plan calls for the establishment of an enterprisewide network based on international standards. Bride said senior management was sold on the long-term benefits of embracing an open systems strategy.

“We showed that money was already being spent on individual private nets, and we established how interconnecting those networks would save money in the long run,” Bride said.

“It starts small, but we showed how the value of the network would grow with each new interconnection,” she said.

Michael Kaminski, manager of

(continued on page 24)

GUIDELINES

BY ERIC SCHMALL

Support from key execs puts push on net projects

Strategic telecommunications decisions affect an ever-widening circle of people and functions within today’s corporations. As a result, network managers need to involve a greater number of individuals when researching and defining network proposals and selecting equipment.

To gain approval for strategic network projects, net managers need to enlist the support of key individuals in a variety of departments who wield influence within the company.

These individuals — whose titles may not always reflect their level of influence within the organization — have the power to make or break a network proposal because their opinions carry a great deal of weight with senior decision makers.

By recognizing who these key people are, where they sit in relation to the final approving authority and what their particular interests are, network managers can wage successful campaigns to get their recommendations approved.

Enlightened network managers will use these individuals as internal consultants to fine-tune network proposals so that they have a better chance of passing the inspection of the company’s top brass. But identifying these people isn’t always easy. The organizational chart often does not provide an accurate road map for determining which individuals have the power to shape strategic decisions in the company.

Net managers should look for those leaders who are well respected by top management and who have been involved in such tasks as strategic planning, technological research, network-intensive line operations and financial analysis.

In addition, project leaders should enlist the support of line

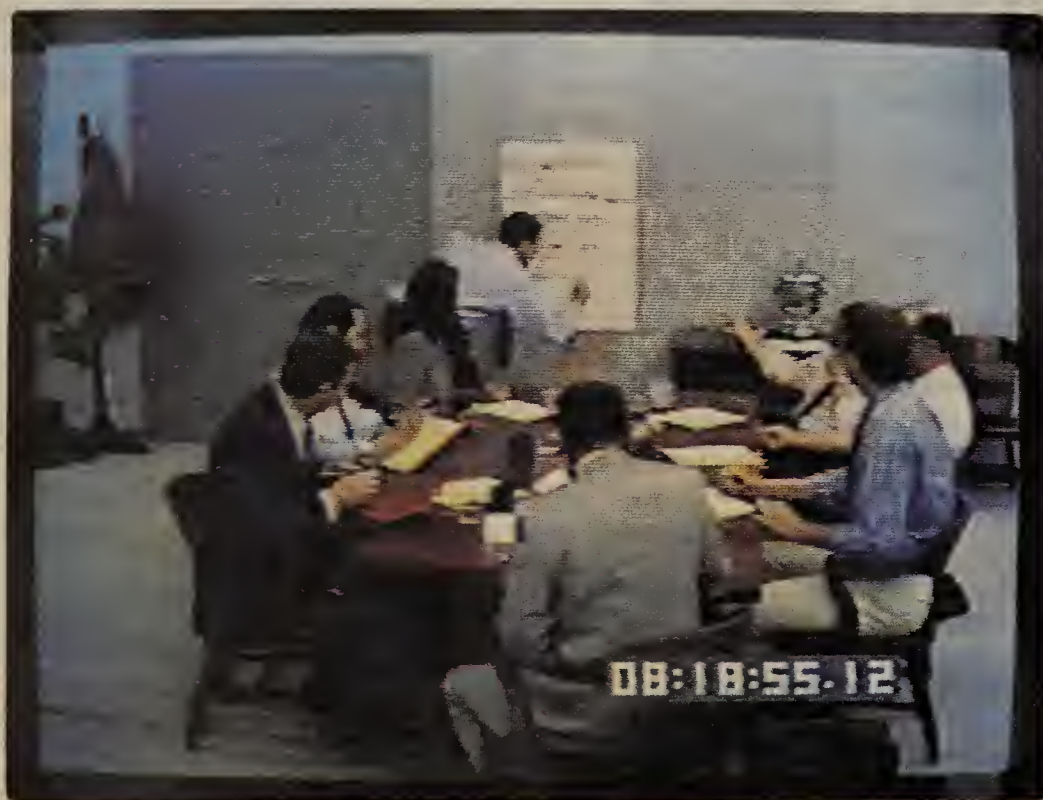
(continued on page 24)



"My ultimate PC system? Well, for starters, it's got to be compatible with everything I've got already... so you can take a floppy from an old PC, pop it into a new one, and it will work."



"Networking PCs is a major pain. I'd like to see PCs designed to do networking without lots of configuration work... and still connect with all the networks I've already installed."



"We've got plenty of data... the challenge is to put it in the hands of decision makers in a form they can use. The perfect PC would be an ideal client to all my information systems."



"Every time I turn around, vendors change the operating system or interface. I want to be able to drop the hottest new box on my executives' desks and know their software will run."

Hidden camera reveals the se

Not long ago, we invited hundreds of IS managers to talk about their wildest desires in a personal computer system.

They talked. We listened. We videotaped. And when we got those tapes back to Silicon Valley, popped them in the VCR and started watching, it confirmed what we knew all along.

They wanted a personal computer system that was compatible enough with their existing PCs to trade files on floppy disks. Like Macintosh.[®]

They wanted a system with the power and flexibility to run thousands of business programs and almost any kind of operating system: MS-DOS, Macintosh and UNIX.[®] Like Macintosh.

They wanted a graphical user interface with no compromise in performance. Like Macintosh.

And they wanted all their software to have a single way of working, so training and support costs could be dramatically lower. Like Macintosh.



"A graphical interface is clearly important... users love 'em. But the architecture has to be designed to handle it or the performance compromise is unacceptable."



"I'd like to see more discipline from software developers. Commands should be consistent for every application... it would eliminate the cost of constantly retraining."



"My company's needs go way beyond off-the-shelf software. I need serious development tools my existing programming staff can use to develop custom apps quickly and easily."



"Macintosh? No kidding?"

secret desire of 200 IS managers.

They wanted a system with sophisticated networking capabilities built in, that could let users access almost any host or file server via any kind of network. Like Macintosh.

They wanted all these things in a wide range of personal computers. That would all work the same way and run the same software. Like Macintosh.

And they wanted powerful development tools that would let their existing programming staff build applications quickly

and easily. Like Macintosh.

In short, they wanted everything that Macintosh offers. But they just didn't realize they could have it today.

For all the details, see an authorized Apple reseller today.

Now that we know all of your secrets, it's time you found out about all of ours.



The power to be your best.™

Panel mulls project perils

continued from page 21

General Motors Corp.'s Technical Center in Warren, Mich., agreed that projects lacking well-defined cost savings can often fall victim to senior management myopia. But he stressed that this rejection often stems from a network man-

year business case when selling GM's strategic network plan, which, like Boeing's, is based on the Open Systems Interconnection model developed by the International Standards Organization.

"We showed how OSI is going to be big in the next few years and explained how an open systems environment is a strategic business move," he said. "Being able to move applications from platform to platform results in richer, easier-to-write applications and, when a hardware platform changes, you don't have to spend millions [of dollars] on new software."

The art of selling

Chuck Papageorgiou, network administrator at United Parcel Service in Paramus, N.J., said top management will not focus solely on a project's return on investment if the network manager can sell the strategic benefits of a technology.

"I hate when IS guys use the excuse that 'upper management won't listen to us' whenever their plans are rejected," he said. "If you've done a good job selling the project's strategic benefits, then management won't be stressing the bottom line."

Len Evenchik, director of com-

munications for the Commonwealth of Massachusetts, uses three metrics — customer support, productivity improvements, and direct and indirect savings — when pitching network projects.

Evenchik said he used the productivity metric to show how a statewide integrated electronic mail system would improve worker productivity and is now using the customer support metric to show how an upgraded telephone system would give customers faster access to state agencies.

"If a company or organization

is going to do anything but follow the pack, they can't look at projects in terms of cost savings alone. But unfortunately, too many do," Evenchik said. "Naturally, savings are always factored into the equation. But you have to educate management on other strategic considerations. And it pays to be a good salesman."

Thomas Festa, president of the Wall Street Telecommunications Association, said the likelihood of winning projects without immediate savings depends on the individual network manager's sales ability and his relationship

with upper management.

"It all boils down to perceptions — how management perceives the IS department in general and how they perceive you as an individual," he said.

Festa also said he believes projects will fare better if network managers can show that competitors are using the same technology with apparent success.

"When you can't quantify [the project] well, showing how others are strategically using the technology may easily be the ticket," Festa said. ■

"If you've done a good job selling the project's strategic benefits, then management won't stress the bottom line."

▲▲▲

ager's failure to outline the soft-dollar advantages of the project.

A strong case

He said managers need to present a compelling strategic case in the absence of a solid cost/benefit analysis.

Kaminski presented his senior management with a three- to five-

Exec support pushes projects

continued from page 21

managers whose operations will benefit the most from the network proposal. They should consult with planning and development groups to see whether the network project dovetails with emerging plans for business and systems applications.

Also, it's never too early to begin talking with people who will perform in-depth financial reviews of network proposals. Continually providing the accountants and analysts with data on the potential cost savings and

productivity enhancements of a new system will help balance the decision-making process in your favor.

All aboard

Whether the key influential players are in finance, line operations or strategic planning, network managers should try to motivate these individuals to become personally committed to the network proposal. This can be accomplished by eliciting their opinions through lengthy interviews on how best to shape the proposal.

In addition, these people should be updated regularly

about the progress of the proposal. If the proposal is for a new private branch exchange, then network managers should keep the key influential players abreast of the vendors and systems under consideration and ask for input.

The payoff for this approach arrives when the network proposal reaches the chief executive staff. Instead of an obscure proposal written and presented in arcane technical jargon, it will represent a broad spectrum of needs within the company and be built upon solid business factors. Most important, it will have the backing of people whose opinions count with senior executives. ■

Ch



Have you noticed the way networks attract more and more hardware as they change?

It's a bridge box here. A router box there. A brouter box here.

Costly devils.

Which is why we've built NETBuilder.® It lets you switch from bridging to routing to brouting by changing a single software diskette. The hardware stays the same.

Ch



To simplify matters even more, NETBuilder's bridge, router and brouter have the same menu-driven user interface. So there's a common look and feel. Yet, you can still create custom menus to suit a particular network environment.

As a result, NETBuilder cuts three big expense items in internetworking—new hardware purchases, and the training and servicing to support it.

Yet, you sacrifice nothing for this simplicity.

Association Watch

continued from page 21

ulatory trends, approaches to rebilling, vendor relations, marketing ethics and technical issues.

Membership in the association is open initially to resellers of long-distance services. Associate member status will be offered to other companies such as carriers and consultants.

For more information, contact Dick Wilson, president of Feek's Telecommunications, Inc., at (206) 641-5240.

Associated Information Managers (AIM) has changed its name to Association for Information Management and redefined its purpose to reflect what the association describes as "broadening the focus to include the management of information within and between organizations. The new AIM will address the needs of organizations as well as of individual members.

Chartered in 1982, AIM serves both information management and information managers, and sponsors educational seminars and an annual conference.

For information on individual or corporate membership, contact Paul Oyer, AIM's executive

director, at 2026-C Opitz Blvd., Woodbridge, Va., or call (703) 490-4246.

To enhance the level of trade payment services that financial institutions provide to corporations, the **Bankers Electronic Data Interchange Council** has released a newly published guide to help the banking industry plan, implement and enhance corporate EDI strategies.

EDI Payments Capable Guidelines describes the origination and receipt capabilities that financial institutions can evaluate when deciding the level of support necessary to meet their customers' needs.

Sponsored by the National Automated Clearing House Association (NACHA), the Bankers EDI Council provides a forum for financial institutions to meet the needs of their corporate customers.

The council also recently published a guide titled *Electronic Dealer Drafting Banking Convention* to assist financial institutions and auto industry personnel with the new format.

The Electronic Dealer Drafting Convention facilitates the standardization of electronic payments between auto manufacturers and their dealers to im-

prove industry efficiency and cash management capabilities.

In the last decade, most payments between auto manufacturers and their dealers have been made by preauthorized checks written against a dealership's account. But the introduction of the new uniform dealer-drafting capabilities allows auto industry payments to be sent more cost effectively using a standard NACHA format.

The booklet discusses the benefits, specifications and a recommended implementation approach.

To obtain a copy of either guide, send a prepaid order to Publications Department, NACHA, P.O. Box 64193, Baltimore, Md. 21264. The cost is \$15 each for members and \$25 for non-members.

The **National Engineering Consortium** will hold its annual Western Communications Forum conference Feb. 4 to 6 in Phoenix. These three-day events offer a full range of seminars on a range of topics including business and marketing, digital switching systems and telecommunications networks.

For more information, call (312) 938-3500 or fax a letter to (312) 938-8787. □

Net gives police access to data

continued from page 21

added to the two mainframes to provide the basis for connecting diverse computing platforms and terminal equipment from the various police agencies in the state — from sheriffs' departments and municipal police departments to highway patrol units and university police forces — into a cohesive information system.

"As long as the front-end processors share the same protocol, LEMS can interface with any piece of hardware in the outside world," said John Turcich, the network's system programmer and LEMS specialist.

Fivefold increase

Turchich said LEMS has allowed the network to handle a fivefold increase in throughput, or about 200,000 transactions per day.

The 2200/401 mainframes are linked to a Unisys Distributed Communications Processor, which supports 32 dedicated lines to police departments and other law enforcement agencies throughout the state.

The hosts provide a gateway to the Federal Bureau of Investigations' National Crime Information Center (NCIC) and National

Law Enforcement Telecommunications System (NLETS), as well as to law enforcement agencies in California.

If requested information isn't located on the host computer's data base, LEMS directs the inquiry to other agencies or to the federal data base.

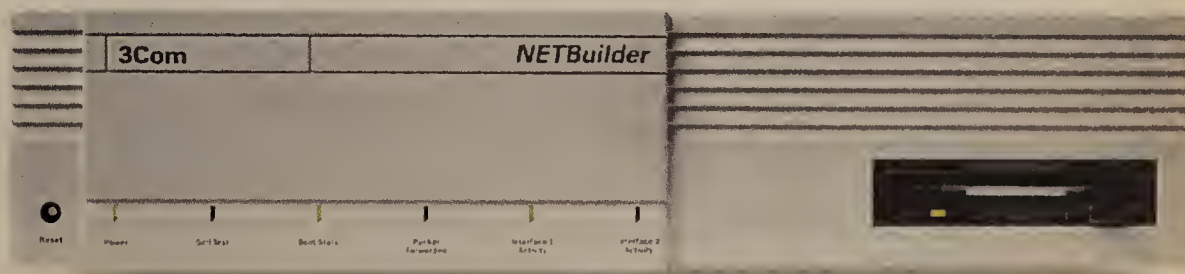
Instantaneous information

For a typical transaction, an officer in Las Vegas might run a license check from a mobile terminal in his cruiser. The inquiry would go from the mobile unit to the Las Vegas police department's host computer and would be forwarded to the LEMS system, which would direct the inquiry to the appropriate data base. Within seconds, the officer would receive a reply.

Rogers said the network can provide even the most remote law enforcement agency with access to vital information.

"The ability to collect, store and disseminate criminal justice information is as important to many law officers as the radios in their cars," Rogers said. "Without LEMS, we could never cope with the massive volume of transactions we handle everyday." □

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See The FAXNeT Form on Page 26

FAXNeT is a service designed to help readers of *Network World* gather important information via FAX on products and services advertised in *Network World*.

How to Use FAXNeT

Listed below in the FAXNeT Directory are the FAX numbers of participating advertisers in this week's issue of *Network World* and the page number where the ad appears. To use FAXNeT cut out the FAXNeT form and make a copy of the form for each inquiry you want to make. Then just FAX it to the vendor's number listed in the FAXNeT Directory.

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- ☐ Within 60 Days
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- ☐ Within One Year

Scope of Purchase Responsibility

- ☐ Enterprise Wide
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Purchase Influence/Number of Sites

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- ☐ 2-9 Sites
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INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

World News

US Sprint Communications Co. recently signed a transpacific cable agreement that will more than double the carrier's capacity in the Pacific region and bolster the route redundancy for its fiber net.

US Sprint said it has purchased an ownership interest in North Pacific Cable (NPC), a transpacific fiber cable project of Pacific Telecom, Inc., Cable & Wireless PLC and International Digital Communications, Inc.

The new cable capacity, scheduled to be available by March, will provide route diversity between Japan and the U.S. via a 5,200-mile fiber loop. A US Sprint official would not divulge the amount of capacity the carrier now has in the Pacific region.

US Sprint said NPC will be the first direct link between Japan and the U.S.

On the U.S. end, NPC will interconnect with US Sprint's domestic digital network and to U.S. Sprint's Private Trans-Atlantic Telecommunications-1, as well as other transatlantic cables. In Japan, NPC will link up with domestic nets.

US Sprint had previously invested in the Hawaii-4/Trans-Pacific Cable-3 under-sea cable projects. The carrier said it plans to buy capacity on the Asia-Pacific Cable being built to link Tokyo and Singapore. That cable should be operational by 1993. A US Sprint spokesman said the carrier has also invested in PACRIM East and PACRIM West cable projects to link Australia with New Zealand and New Zealand with Hawaii by late 1992. **■**

NMI's I-MIND lets users create simulated int'l nets

Models show the best solution for lowest price.

By Barton Crockett
Senior Editor

FAIRFAX, Va. — Network Management, Inc. (NMI) recently introduced software that enables users to create simulated models of international networks and optimize their performance based on cost factors.

NMI's new International Modular Interactive-Network Designer (I-MIND) uses an extensive data base of international tariffs and proprietary network design algorithms to help users select the most inexpensive architecture for international private-line

updates. NMI obtains tariff information directly from foreign post, telegraph and telephone administrations and by subscribing to tariff information services from Eurodata Foundation and Logica, Ltd., both of which are in London, Rubin said.

In order to use I-MIND, users first enter the locations they wish to network. If a user enters locations by their telephone number, I-MIND matches the country code and city code in the number to a location's exact longitude and latitude. This information can be used to prepare a graphical representation of a user's network.

A user then enters the type of application being used at each location, choosing from a list of 100 applications including inventory checks, credit checks, funds transfers and reservations. Then for each application, the user enters the average length of input messages, output messages and the average host processing time.

Next, a user enters the number of messages sent out by each location in the busiest hour and keys in the possible destinations for these messages. Alternatively, a user could enter the number of characters generated by different locations on the network.

Users also enter various performance criteria required on the network, including specifications for maximum response time and the degree of route redundancy required. Using this criteria, I-MIND then will plot the most cost-effective network a user could design, Rubin said.

Alternatively, users can use I-MIND to analyze response times and performance on an existing net under different traffic loads.

"What this does is eliminate
(continued on page 30)

The software, I-MIND, will be enhanced to offer data on tariffs in 30 countries by midyear.

▲▲▲

data networks that meet a user's minimum specified performance requirements.

I-MIND runs on IBM-compatible personal computers and contains current data on all international gateway private-line tariffs supported in 80 countries. In addition, the software contains information about domestic tariffs in six major European countries, including France and the U.K.

According to David Rubin, general manager for NMI's network analysis center, I-MIND will be enhanced to offer data on tariffs in 30 countries by the middle of this year. NMI updates I-MIND tariff listings monthly by mailing out new floppy disks with tariff

Proposed CCITT rules for international private lines

- ☐ Unless national regulations state otherwise, users should:
 - Be able to subdivide international circuits into multiple channels and extend channels through links with other private lines.
 - Use international circuits to sell network services that don't infringe on carrier monopolies.
 - Use international circuits to establish links to customers and other users.
 - Interconnect one or both ends of international circuits to public networks.
- ☐ International private-line pricing should reflect provisioning costs fairly and be generally based on flat-rate tariffs.
- ☐ Carriers should not levy tariffs that discriminate against groups of users or vendors.

Excerpted from draft revision of CCITT Recommendation D.1, "General Principles for the Lease of International Private Telecommunication Circuits and Networks."

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: CCITT STUDY GROUP III, GENEVA

CCITT to advocate global net freedom

Proposal would encourage resale of int'l private lines and bring pricing in line with service costs.

By Barton Crockett
Senior Editor

GENEVA — The Consultative Committee on International Telephony and Telegraphy is close to approving a new recommendation that calls for a dramatic loosening of foreign government regulations on international private networks.

The proposed revisions to CCITT Recommendation D.1 — "General Principles for the Lease of International Private Telecommunication Circuits and Networks" — represent a dramatic departure from the current CCITT D.1 Recommendation, which has encouraged carriers to adopt restrictive regulations on private networks (see graphic, this page).

The proposed changes would, among other things, encourage foreign governments to allow re-

sale of capacity on international private lines and bring private-line pricing in line with the actual costs of providing service.

While the CCITT D.1 Recommendation is not legally binding, it serves as the foundation of regulatory policies for most countries around the world. Adoption of a more liberal D.1 Recommendation is expected to prompt many countries to loosen restrictions on international leased lines, which would make it easier for users to build and operate international private nets.

"We believe this will create the opportunity for millions of dollars worth of new telecommunications and information services," said Earl Barbely, director of telecommunications and information standards at the U.S. Department of State's Bu-
(continued on page 30)

What it takes to be the international specialist.

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—Larry Uline,
Manager, Technical Support
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EC exec discusses benefits of satellite push in Europe

Expects countries to support green paper's goals.

Q&A The European Commission's publication of the satellite communications green paper in November stands out as one of its largest regulatory initiatives ever undertaken.

In the green paper, the European Commission calls for the inception of free competition in virtually all of Europe's satellite communications markets. Currently, most of Europe's national post, telegraph and telephone administrations maintain a monopoly over provision of both satellite services and earth stations that receive and transmit satellite signals.

Even though the satellite green paper is only a position statement by European Commission regulators, it is expected to be followed by specific legislation in coming years. Thus, the green paper is expected to play a key role in breaking down barriers to

ble for developing commission policies concerning telecommunications, information technology and innovation.

Howell spoke with Crockett at the headquarters of DG XIII in Brussels, Belgium.

For an American audience, how important is the European Commission's satellite green paper?

Various people in the satellite communications field have said they regard it as perhaps the most important satellite communications paper worldwide since the original INTELSAT, [International Maritime Satellite Organization and European Telecommunications Satellite Organization] conventions [that established the world's three largest international satellite consortiums].

Now I raise my eyebrows at that. Certainly I would argue, as a satellite man, that [President] Reagan's decision in 1984 [to allow greater competition between satellite service providers in the U.S.] was a key decision.

But whether we like it or not, the satellite green paper could have a big impact, even in the [U.S.]. For example, one of the [parties] scratching their head about this is COMSAT [based in Washington, D.C.].

This is because [in the green paper] we question whether telecommunications administrations should continue in their role [as monopoly providers of access to EUTELSAT]. This says something about the future of COMSAT [which is the U.S.' monopoly provider of access to INTELSAT].

EUTELSAT, INTELSAT and INMARSAT are so similar that if you change the rules on one, you may have an impact on the other. [This then affects] the whole argument going on now in front of the Federal Communications Commission over whether COMSAT should retain its monopoly [over access] to INTELSAT and INMARSAT [facilities].

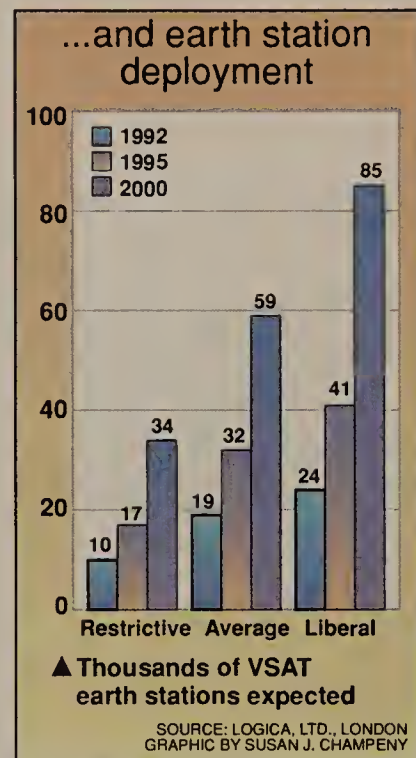
How long will it be until Europe's satellite regulations change as a result of the green paper?

We will close the commentary

period on the green paper probably in April. Then, directives [enacting actual policies outlined in the green paper] will be implemented toward the end of 1991 and will be formally in legal application before the famous Jan. 1, 1993, deadline [for the inception of Europe's Common Market].

But one should expect that lots of countries will go along [with the green paper] before that.

You see, there's already a lot of synergy going on because



you've got people like the British and the Germans who are going ahead [and allowing free competition in satellite communications].

The European Commission has commissioned studies that found if satellite restrictions are lifted, Europe's satellite markets will boom. Why will they?

The first thing to remember, of course, is that there is not a block on national [telecommunications] administrations providing satellite services themselves, and most of them could and should.

So I think you can turn the question around the other way and say 'Why has the market been so constrained?'

My own analysis — and this is a remark of someone who has spent 25 years in the satellite field — is that satellites have not been used [extensively in Europe] because everybody's always sort of looked sideways and said, 'Well, how could we offer that service by microwave link or some other means?'

There's been quite a constraint on the development of satellite use in Europe, mainly because of that sort of reaction [by monopoly carriers]. If we end these artificial restraints, I think more services and equipment will be sold.

Where will the greatest demand for satellite services materialize among users?

I think we'll see exactly the same kind of users getting interested in satellite networks here as you have in the states.

For example, I'm willing to bet money that [Electronic Data Systems Corp.] will do exactly in Europe what it's doing in the states [for General Motors Corp.]. That is, it will put in a VSAT network, probably run by EDS using Hughes Network Systems [Inc.] equipment, that will loop out to all of GM's European divisions.

I think you'll see the European carmakers more or less taking a running jump at satellite networks, just like they have in the states.

And of course the financial people will be interested, including people at the exchanges in Paris, Copenhagen, Denmark, and the London Stock Exchange.

And you've also got the press agencies, like Reuters [Information Service, Inc.] in the U.K., that will be interested.

In which countries do you think satellite networks will be most widely used?

I think in Germany, mainly because of the need for communication into East Germany. I also think we will watch with immense interest the development of the U.K. market.

And do you think there will be large demand for satellite networks in the countries with weak terrestrial infrastructures?

Yes, I think you will find that people in Spain and Portugal, for example, as well as in Italy, will be very interested. In fact, Italy has been the most active user of VSAT networks in the Common Market.

There are about 10 to 12 different VSAT networks in Italy with about 400 to 500 terminals. This is because Telespazio, [Italy's main provider of domestic satellite services] is only able to offer satellite services. So if it doesn't sell satellite systems, it dies. ☐

CCITT advocates net freedom

continued from page 27

reau of International Communications and Information Policy.

Barbely led a U.S. delegation at a meeting of CCITT Study Group III here last November that approved a new draft of the D.1 Recommendation for consideration under the CCITT's accelerated standards approval process. The draft proposal will be voted on at a meeting of Study Group III in March.

If the new draft of the D.1 Recommendation receives unanimous support, it will be put out to ballot with all 120 member countries of the CCITT. At least 70% of these countries must approve the text before it becomes an official CCITT recommendation.

The approval of the new draft proposal is significant because it marks the first time a consensus has formed within the CCITT in favor of liberalizing regulations.

The U.S. has tried to reform the CCITT D.1 Recommendation since the 1970s, according to State Department sources. But its efforts have been opposed by countries concerned that an excessively liberal regulatory system could encourage users to migrate to private networks from switched services and lead to a reduction in revenues for national telecommunications carriers.

Among other things, the new D.1 proposal encourages countries to allow users to resell capacity on international private lines. The current recommendation urges carriers to ban such a practice.

The proposal also encourages carriers to allow private companies to offer value-added services over international private lines. That also is discouraged by the current D.1 recommendation.

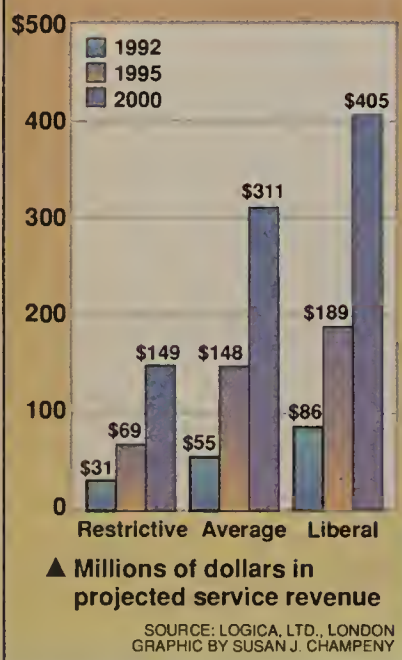
In addition, the new proposal urges carriers to base international private-line tariffs on provisioning costs. The current recommendation does not include a provision for pricing, which leaves many carriers free to charge exorbitant rates for international private lines and to use profits from these services to subsidize other operations.

The new proposal also states that carriers should freely allow users to interconnect international private lines.

According to Ron Bell, manager of telecommunications at The British Petroleum Company PLC, one of the biggest difficulties users face when building international private nets, especially in Europe, are restrictions on the interconnection of private lines.

For example, Bell said carriers prohibit users from running a 9.6K bit/sec private line from one country to a hub in another country and then multiplexing traffic from that line with other traffic onto a 64K bit/sec circuit to a third country. ☐

Regulation's effect on satellite service revenue



competition in Europe's satellite markets.

Network World Senior Editor Barton Crockett recently discussed the importance of the satellite green paper and the effect it could have on European users with Tim Howell, one of the principal authors of the document. Howell heads up the satellite policy division within the European Commission's Directorate General (DG) XIII, which is responsi-

I-MIND creates simulated nets

continued from page 27

the need to sit down with a pencil and paper and plot it all out," Rubin said.

Even though the software costs \$24,000 for a single copy, bulk discounts are available. Rubin said he expects about 60% of the I-MIND customers to be users

and 40% to be vendors and consultants. He added that Codex Corp.'s Brussels, Belgium, unit, Nynex Corp. and Price Waterhouse are the first users.

Rubin added that the software consumes 15M bytes of hard disk space and requires 480K bytes of

main memory. NMI recommends that users run I-MIND on a personal computer with a video graphics adapter board and color monitor to support the software's graphics capabilities.

Rubin said users mapping out networks with 100 or fewer locations would probably get acceptable response time running I-MIND on an IBM Personal

Computer XT. He said users with as many as 2,000 locations would probably want to run the software on personal computers comparable in power to Intel Corp. 80286 or 80386SX machines, and users mapping out networks for about 16,000 locations would want to run the software on personal computers comparable to 80386 and 80486 machines. ☐

PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

Rabbit Software offers The Visible Advantage

Rabbit Software Corp. recently rolled out **The Visible Advantage**, emulation software that enables a personal computer to simultaneously display as many as four full-screen IBM 3270 host sessions in monochrome or color.

Aimed primarily at network managers and customer service representatives, the software enables remote users to download files from a host. It is designed to replace the IBM 3290 terminal, a product IBM has announced it will stop manufacturing.

On **The Visible Advantage**, operators can configure and save as many as 10 screen layouts and hot-key between them.

Shipping since last month, **The Visible Advantage** can run on a DOS-based server and be shared by local-area network workstations or be implemented as a stand-alone on a DOS-based personal computer linked to a host via token-ring, coaxial, Synchronous Data Link Control or bisynchronous connections.

The software carries a list price of \$495 per workstation.

Rabbit Software Corp., Great Valley Corporate Center, 7 Great Valley Pkwy. E., Malvern, Pa. 19355; (215) 647-0440.

Neon Software unveils LocalTalk analysis tool

Neon Software, Inc. recently introduced **NetMinder LocalTalk**, an analysis tool that enables net managers to analyze network traffic on an Apple Computer, Inc. LocalTalk net for protocol errors, hardware faults and throughput delays.

The product, which is software that runs on Macintosh workstations, collects packets of data as they flow through the network and enables a user to take a snapshot of the traffic and break it down to determine the cause of a network failure or abnormal condition. **NetMinder LocalTalk** costs \$395.

Neon Software, Inc., 1009 Oak Hill Road, Suite 203, Lafayette, Calif. 94549; (415) 283-9771. ☐

Racal-Milgo encryption device bows

By Jacqueline Emigh
Staff Writer

SUNRISE, Fla. — Racal-Milgo recently announced a data encryption unit based on a proprietary algorithm, a new offering that will enable customers abroad to purchase the device without obtaining clearance from U.S. authorities.

Racal-Milgo's new **Datacryptor 64P**, which attaches to computer equipment, encodes and decodes data for transmission across public and private networks.

Because it is based on a proprietary encryption algorithm, buyers from abroad do not have to seek Data Encryption Standard licensing with the U.S. Department of State to purchase the equipment, as they do with Racal-Milgo's other data encryptors that support the standard.

The **Datacryptor 64P** comes in a choice of basic, public key and key center versions.

Larry Zoley, product manager at the company, expects the low-cost basic version of the **Datacryptor 64P** to be used mainly on small nets, while the public key and key center systems are best suited for midsize and large networks, he said.

All three versions are used to generate, distribute, store and

erase key variables, or numbered codes produced by the algorithm to conceal data.

Each version of the **Datacryptor 64P** supports point-to-point, multidrop, dial-up and facsimile transmissions at speeds up to 19.2K bit/sec over asynchronous lines and 64K bit/sec over synchronous links in full- or half-duplex operation on switched or dedicated lines.

Datacryptor 64P units can operate in three modes: secure, in which data is encrypted; bypass, meaning encryption is bypassed; and standby, in which all data is blocked. Different operating modes can be used on the same network simultaneously.

If the unit is tampered with, the equipment automatically erases parameters to their default values.

Basic versions of the **Datacryptor 64P** are distributed among devices across a network. Only one **Datacryptor 64P** produces codes, which are downloaded into a hand-held key transport module and manually fed into each remote unit.

The public key system does not require the use of the transport module. Instead, distribution of key codes are transmitted across the network. However, the public key system does not offer the centralized network management provided by the key center system.

In the key center system, key codes are produced at a key center unit. From there, they are manually fed into a central unit via a key transport module, which
(continued on page 52)

Monopad connects single workstation to X.25 net

LONDON, Ontario — Microtronix Datacom, Ltd. recently introduced an X.25 packet assembler/disassembler that links a single asynchronous terminal or workstation to an X.25 network.

The company's **CSI-X.25 Monopad** is a low-cost alternative to a multiport PAD for retail stores and other small businesses or branch offices. It is less costly and more convenient than many X.25 PAD adapters that fit into a personal computer, the company said.

Similar in appearance to a modem, the monopad can be used with any device that has an asynchronous communications port, including VT-100 and VT-220 terminals from Digital Equipment Corp. and personal computers from a variety of vendors.

According to Scott McNamee, a Microtronix Datacom sales en-

gineer, the device is a cost-effective alternative to an X.25-based personal computer card. The **CSI-X.25 Monopad** costs \$1,000, compared with \$1,500 to \$2,500 for an X.25 adapter card, he said.

Unlike an adapter card, the monopad attaches externally so installation can be performed without disassembling and reassembling the terminal. On the back of each PAD are two ports — one for attachment to a serial line interface on a terminal or workstation and one for linking with the X.25 net.

Available now, the **CSI-X.25 Monopad** supports the VISA 1 protocol for point-of-sale retail applications.

For more information, write to Microtronix Datacom at 125 Bessemer Road, London, Ont., N6E Canada, or call (519) 681-3430. ☐

Firm gives terminals role in image nets

Image-X's PSERVER enables terminal users to print text/image files stored on image systems.

By Jacqueline Emigh
Staff Writer

SANTA BARBARA, Calif. — Image-X International recently announced a print utility that enables terminals to instruct its Image-X and ImageMate imaging systems to print a compound text and image file.

The company's **PSERVER** software enables users to integrate terminals into a local-area network-based imaging environment by providing them with the means to view text files and print compound documents they cannot display on screen, according to Image-X International President Mohammed Shaikh.

PSERVER consists of two software modules.

A basic requester module resides on minicomputers or mainframes and enables attached terminals to request printouts of compound documents.

A server-based module resides on the company's Image-X file server or ImageMate imaging processor, which handles image scanning and compression.

Requests to print files are shipped over an Ethernet, token-ring LAN or via asynchronous communications lines to the Image-X or ImageMate units. Those units look up the file, decompress it and route the data over the network to a local printer.

"Imaging is nothing new," Shaikh said. "But we have customers who are telling us they have no way of using their dumb terminals with an imaging system. **PSERVER** at least will enable them to view the test file and obtain a printout of the compound file."

Finding jobs fast

Shaikh said the company originally developed **PSERVER** to run on a Data General Corp. MV minicomputer used by the San Bernardino County Personnel Office in San Bernardino, Calif.

The county employment office wanted to implement document imaging but without giving up its installed base of ASCII terminals, explained Ted Darany, employment chief for the office.

The office is using **PSERVER** to print employment applications and resumes for the 50,000 people who seek jobs with the county each year, along with handwritten staff notes on the applicants' status.

"Our primary requirement was to have every job application [accessible] all of the time," Darany said. "When you have this many applicants, one of the major problems is keeping track of them."

Before **PSERVER** was implemented, the office was storing basic information about each applicant, such as name, address and phone number, on a relational data base.

More extensive information, however, remained on paper stored in filing cabinets within a central area.

The company's PSERVER enables users to integrate terminals into a local-area network-based imaging environment.

▲▲▲

When phone calls came in from applicants, staff members had to thumb through the filing cabinets for the appropriate files.

Now copies of the files can be accessed almost instantaneously by searching the data base, finding the desired document and pushing a function key on the terminal.

Currently, the setup supports about 30 terminals, but the employment office is considering adding a dozen terminals with X Window System graphical capabilities, Darany disclosed.

These, he suggested, would be able to display data base files and image files on different windows of an X Window-based screen.

"That way, professional staff will be able to do some of their decision making right on screen without having to wait for paper to be retrieved for them," Darany said.

Available immediately, the **PSERVER** printing utility costs \$695.

For more information about the product, call Image-X International at (805) 964-3535 or write to the company at 5879 Hollister Ave., Santa Barbara, Calif. 93117. ☐

Saying A Systems Integrator Make You

There's more to being a systems integrator than just saying so. International Data Corporation – the renowned industry research firm – has established criteria to benchmark those who claim to be systems integrators. They must:



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- Carry out the project management activities of various specialists.
- Assume full systems' performance and financial responsibility for successful implementation.



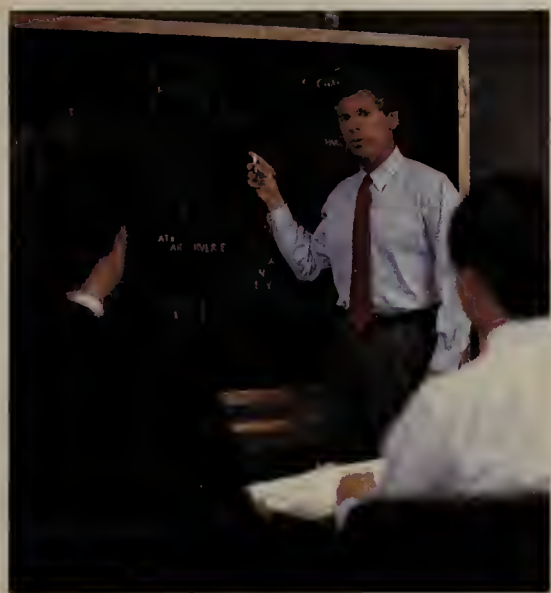
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OPINIONS

NETWORK SUPPORT

BY JEFFREY KAPLAN

Serving the "Forgotten Five Million"

Small and midsize companies should no longer consider themselves the "Forgotten Five Million." A number of forces have combined to bring a greater range of network support services to users of all sizes.

As product shipments have slowed, vendors have been forced to look for additional revenues to sustain their growth. And as their product technologies have become increasingly similar, they have sought new ways to differentiate themselves. Both of these trends have led vendors to strengthen their service and support capabilities. These efforts are most evident in the expanded service portfolios vendors now promote. Users can obtain everything from needs assessment studies to outsourcing services from their network equipment suppliers.

Vendors that are new to the market are targeting the smaller companies. While the trade press focuses on the major systems integration and outsourcing contracts that are the boldest examples of the heightened emphasis on service and support, small and midsize companies should not feel that their needs are once again being overlooked. In fact, the network support market is feeling a trickle-down effect, which has positive implications

for users that were once victims of strict vendor support policies and neglectful practices.

Too many other vendors are now waiting at users' doors to allow a primary supplier to be inflexible. As network hardware becomes more reliable, users are becoming less willing to pay for standard service contracts.

Instead, users are looking for help to utilize their networking equipment better. They want vendors with consulting skills to work with them on designing nets that serve as transparent facilities in both local- and wide-area network environments. Vendors are investing heavily in recruiting support personnel and retraining current staff with these new skills.

How do these efforts benefit small and midsize users? Since major manufacturers and systems integration vendors tend to focus on Fortune 500 companies, vendors that are new to the market are targeting the smaller companies. And while outsourcing appears to be in full swing, many of the Fortune 500 companies currently evaluating this support alternative are expected to continue to use their in-house staff to operate their networks. This trend will again lead vendors to lower their sights and aim their expanded service capabilities toward smaller users that are in greater need of outside support.

Small and midsize companies should take advantage of these trends. They should not accept any vendor's claim that there is only one support alternative. Nearly every major network vendor offers multitiered support programs. In many cases, these vendors are willing to negotiate service arrangements and pricing. However, users should be careful not to force a vendor to accept a pricing structure that discourages the vendor from delivering quality service.

According to research by The Ledgeway Group, network support customers, big and small, were more satisfied with the service performance of their vendors in 1990 than in the past. Today's competitive environment is good for users of all sizes. As a result, there are fewer reasons for customers to accept anything less than quality support. ■

Kaplan is director of networks and professional services with The Ledgeway Group, a market research and consulting firm in Lexington, Mass.

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EDITORIAL

A few thoughts about New Year's resolutions

There's much to be said for the tradition of New Year's resolutions. If taken seriously, they can be opportunities for new beginnings. Therefore, as 1991 begins, we propose a few resolutions for users to consider:

■ Resolve to get involved with user groups and standards bodies working to advance the interests of business users.

Such professional organizations as the International Communications Association, the Tele-Communications Association, Inc. and the Communications Managers Association are powerful voices for change. So are such vendor-specific user groups as the ONE User Group and such vertical industry groups as the Wall Street Telecommunications Association.

The progress achieved by these and other organizations is the result of the hard work and commitment of individual network executives who devote

time and energy to furthering the user cause.

By offering your assistance, you'll have the satisfaction of helping steer the industry and you'll benefit from the professional networking these associations foster.

One group merits particular attention this year. Any company concerned about the migration to open systems — and that includes virtually every company — should consider joining the User Alliance for Open Systems (UAOS), which is now part of the Corporation for Open Systems International (COS).

UAOS is devoted to overcoming the barriers to open systems and speeding the development and deployment of open systems products. This organization really needs the support of users. Anyone interested in finding out more about UAOS should contact COS at (703) 848-4572.

■ Resolve to get closer to end

users and upper management within your company and encourage network staff members to do the same.

It's easy to talk about understanding business goals and end-user needs, but too often network executives fail to establish ties with either the people who rely on their services or those who establish business strategy. With economic storm clouds gathering, now is the time to turn networking into a strategic edge through closer contact with the people on the front lines.

■ Resolve to make the most of industry competition in the year ahead. With the fear of recession uppermost in every supplier's mind, users should push hard for lower prices and additional concessions. Renegotiate contracts where possible. Controlling or cutting costs can help your organization in the tough times ahead and make you a hero.

Happy New Year. ■

OPINIONS

SYNCHRONOUS OPTICAL NETWORK

BY NATHAN MULLER

Correcting some myths and misconceptions about SONET

Synchronous Optical Network (SONET) technology has traditional T-3 manufacturers running scared. They must begin to phase in SONET products without disrupting "cash cow" T-3 sales to carriers.

Unfortunately, both traditional T-3 suppliers and new T-1/T-3 entrants are trying to protect their turf by issuing misinformation about SONET, especially concerning its standardization status, reliability and availability.

The SONET standards already define the physical parameters and hardware requirements of the technology. Various management issues, such as the definition of message sets, are close to being resolved. Message sets permit carriers to continuously monitor performance and implement protection switching and security features over SONET's embedded diagnostic channels.

One argument T-3 advocates use against SONET is that it exposes users' data to unnecessary risk. If an optical fiber is cut, T-3 proponents claim that gigabits of information can be lost, a claim that ignores SONET's integral protection capabilities.

SONET-compliant equipment is redundant in order to protect against system failures, and SONET routes may be equipped with redundant fiber. SONET network elements automatically bypass failing facilities to prevent loss of data.

Another criticism of SONET is that it requires extra equipment on the network such as add/drop multiplexers and terminal multiplexers, which can introduce potential points of failure. However, not only does such equipment provide system redundancy, it offers many advantages not found in proprietary T-3 systems.

Muller is manager of consultant relations at General DataComm, Inc. in Middlebury, Conn. His company has announced a SONET multiplexer.

First, SONET equipment eliminates unnecessary network elements such as back-to-back M13s and patch panels. Second, such equipment is used to extend full functionality to the user's premises, not just to provide customer premises equipment with connectivity to certain network elements, such as with T-3.

Third, with SONET equipment end to end, both the carrier and user may monitor performance, identify problems, and initiate diagnostics and restoration, which isn't possible with proprietary T-3 systems.

Some T-1 and T-3 vendors maintain that the user will have an easy migration path to SONET. They claim that all the user needs to do is insert the SONET-compliant interface card into the box containing the SONET core. But the trouble with vague promises is that they leave a lot to the imagination.

These are legitimate concerns, considering that a migration between two fundamentally different architectures is being espoused: T-3 is an asynchronous extension of T-1, while SONET, as its name implies, is synchronous. Moving from the former to the latter is not easy.

No T-1 and T-3 vendor has addressed the issue of network management, which is not surprising since a critical drawback to T-3 is its lack of network management capabilities. Through integrated network management, existing customer premises equipment and SONET network elements may be joined to constitute a single, homogeneous network.

Monitoring and control are handled using an integrated network management system, which provides access to all SONET overhead functions as well as trouble ticket administration, customer report generation, multilevel operator security and system utilities. T-3 has no such capabilities.

Local and interexchange carriers are abandoning T-3 in favor of SONET. And users are finding it makes sense to stick with industry standards and carrier expansion plans when designing broadband networks, if only because the cost of misplaced capital investments is becoming increasingly difficult for many companies to bear.

Of course, T-1 and T-3 vendors are very much aware that they must at least "talk SONET" to prevent users from looking elsewhere for broadband networking solutions.

One way to address SONET is to say that the T-3 product's core or switching matrix is SONET-compliant; all it lacks are the appropriate interfaces. This is somewhat akin to paying for your dry cleaning but walking away with only the hanger!

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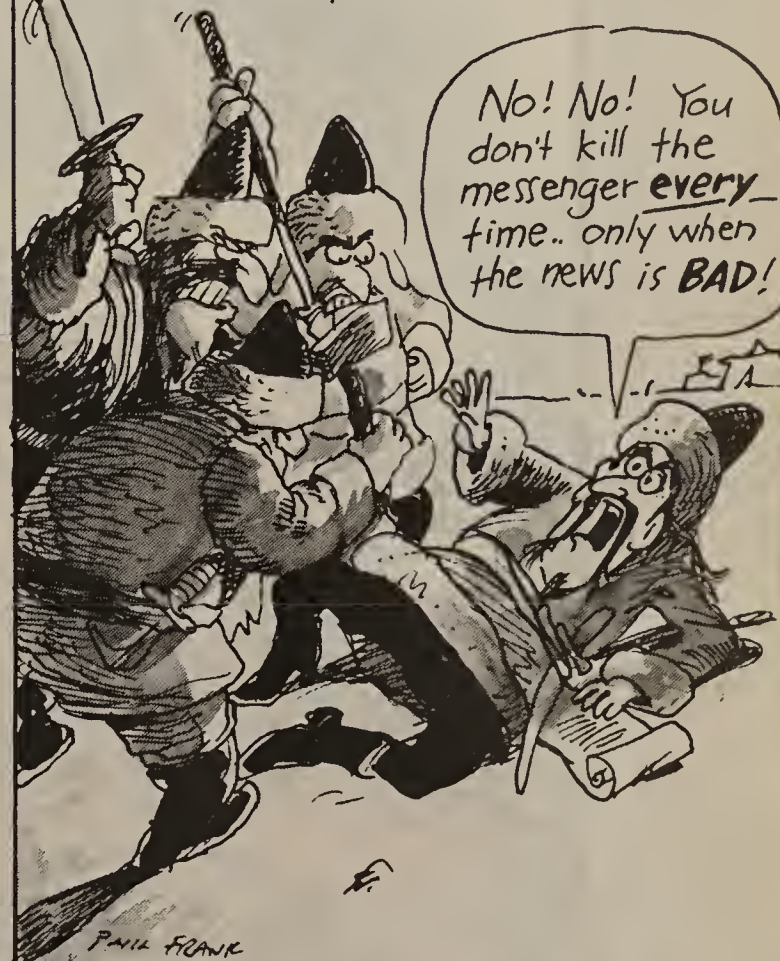
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TELETOONS

BY FRANK AND TROISE

The History of Networking: CHAPTER 66

Ancient peoples had to de-bug their networking systems, much as we do today.



LETTERS

Voicing Qualnet support

As president of the ONE User Group, I would like to clarify some statements regarding AT&T's new Qualnet support service in your article "AT&T riles users over plan to levy Qualnet service fee" (NW, Dec. 17, 1990).

The ONE User Group supports AT&T's goal of providing consistent, high-quality technical support. Qualnet is AT&T's response to market demands, downsizing, its own restructuring and users' increasing reliance on multivendor networks. Rather than spread itself too thin across the Customer Network Support (CNS) centers, AT&T decided to consolidate its expertise in White Plains, N.Y.

Qualnet is not a repackaging of the old service provided by the CNS. It provides expanded responsibility and expertise that the ONE User Group feels will be hard to match anywhere in the industry.

The value for the cost is a decision that each company will have to make on its own. While our members try to

understand more about Qualnet, the user group stands as the forum for continuing discussion on this and other important telecommunications issues.

In our opinion, the ONE User Group is the logical choice as the user group for the Qualnet customers. We welcome additional membership and can be reached at (201) 658-2868.

Tom Lonsbury
President
ONE Users Group
Bridgewater, N.J.

More on multiprocessing

I read with interest your article titled "LAN vendors mount drive to support multiprocessing" (NW, Dec. 10, 1990) and want to correct a

(continued on page 44)

Network World welcomes letters from its readers.

Letters should be typed and double-spaced. Mail them to Editor, Network World, 161 Worcester Road, Framingham, Mass. 01701.

Letters may be edited for space and clarity.

LIKE ALLIGATORS IN A SWAMP, unforeseen problems can really put the bite on your communications operation. Many managers find themselves wrestling with these networking reptiles every day.

If you've survived an "alligator attack," share it with our readers by calling Susan Collins, assistant features editor, at (508) 820-7413 or fax your idea to us at (508) 820-3467. The article should tell how the problem was solved and what steps can be taken to prevent it. Alligators should be 1,200 words in length and submitted either on disk or via modem.



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FEATURES

Making Macs work with PCs

By EDWIN MIER

Over the past few years, basic links between Macintoshes, Apple Computer, Inc.'s popular brand of microcomputers, and the massive installed base of IBM Personal Computers have improved immeasurably.

But face it — there's a big difference between connectivity and true interoperability. Sure, personal computers and Macintoshes can share printers and even some files when both types of microcomputers are hung on a local-area network.

But true integration — in which networked users working on one platform can access, interpret, alter and exchange data files with their peers on the other — still has a way to go before becoming a reality.

So the effort to bring true integration to the user has now shifted to a higher plane. The complex presentation and ap-

Mier is president of Mier Communications, Inc., a Princeton Junction, N.J.-based network consultancy that specializes in customized protocol analysis and planning.

plication layers are where the campaign for Macintosh-to-personal computer interoperability is being waged.

Definite trends are now emerging concerning the issues and components that affect such integration. These trends focus on the following goals: allowing Macintoshes and personal computers to access the same LAN server; creating interoperability between them by developing the same applications to run on both platforms; and creating interoperability beyond the server.

Access to the same server

Connecting Macintoshes to an otherwise personal computer-only LAN is relatively easy. And it is equally straightforward to let both classes of clients access a common server, use the same printer and even enable users on one type of computer to gain entry to files generated by the other type of computer.

Today, these options are more or less standard. A comparison of three prominent vendors' LAN operating systems — Novell, Inc.'s Advanced NetWare 286 Version 2.15, AT&T's StarGroup LAN Manager Server

and 3Com Corp.'s 3+ Open LAN Manager — shows that all have taken nearly identical implementation approaches to making such connections.

But although the approaches are similar, prices for establishing this connectivity vary considerably from vendor to vendor (see graphic, page 40).

In addition, there is still a problem connecting Macintoshes and personal computers to Novell's latest version, NetWare 386. As with earlier NetWare versions, the 386 package includes Novell's proprietary server operating system integrated with all of Novell's networking software modules.

But the 386 version lacks direct Macintosh connection support. Due to production delays, Novell's AppleTalk NetWare Loadable Module (NLM) for NetWare 386 is not yet available.

In the interim, Novell users must employ the earlier NetWare 286, which includes the NetWare for Macintosh software. Thus, a NetWare 286 server running the Macintosh software needs to be configured as a gateway for Macintoshes that seek access to the 386 server.

(continued on page 38)

To fully harness these two microcomputer platforms, users must seek solutions above the network layer.

Prevalence of Macintosh and PC file formats

Application/file type	File format, data structure or file/data exchange convention	Derivation of file format	Prevalence in Macintosh environment	Prevalence in PC environment (1)
Word processing/text files	Document Content Architecture (DCA)	IBM specification	Mainly for file import from and export to PCs	Moderate
	DisplayWrite	IBM specification	Moderate	Moderate
	MacWrite (original and MacWrite II)	Apple Computer, Inc./Claris Corp.	Moderate to high	Mainly for file import from and export to Macintoshes
	MultiMate (text)	Ashton-Tate Corp., latest version	Mainly for file import from and export to PCs	Very high, declining
	Rich Text Format (RTF)	Alternate file format from Microsoft Corp.	Low	Low
	Word	Microsoft	Extremely high	Very high
	WordPerfect	WordPerfect Corp.	Very high	Extremely high
	WordStar	MicroPro International Corp.; older PC base	Mainly for file import from and export to PCs	Moderate
	Works (text and word processing)	Microsoft; text files in integrated package	Moderate	Mainly for file import from and export to Macintoshes
	XyWrite III	XyQuest, Inc.; wide use in publishing industry	Mainly for file import from and export to PCs	Moderate
Graphics/print files	ASCII Text	Supported by most text applications; default file format	Least common denominator text-file exchange method; PC-to-Macintosh and Macintosh-to-PC peculiarities, special-character problems	Least common denominator text-file exchange method; PC-to-Macintosh and Macintosh-to-PC peculiarities, special-character problems
	Encapsulated PostScript (EPS)	Adobe Systems, Inc.; increasingly used for mixed text and graphics	Very high	High
	PostScript	Adobe Systems; developed for laser printer output	Extremely high	Moderate
	Computer Graphics Metafile (CGM)	Software Publishing Corp.'s Harvard Graphics, Lotus Development Corp.'s Freelance, others	Mainly for file import from and export to PCs	Very high
	.PIC	Used by Lotus for charts	Mainly for file import from and export to PCs	Moderate
	PIC	Bit-mapped images, paint applications	Very high	Mainly for file import from and export to Macintoshes
	PICT, PICT2	Industry standard for Macintosh object images	Extremely high	Mainly for file import from and export to Macintoshes
	DXF	Autodesk, Inc.'s AutoCAD; CAD/CAM	Mainly for file import from and export to PCs	Moderate
	Tagged Image File Format (TIFF)	Used by scanners for scanned-image files	High	High
	PCX	Z-Soft Corp.'s PC Paintbrush; bit images	Mainly for file import from and export to PCs	Moderate
	WordPerfect Graphics (WPG)	WordPerfect for graphic images	Mainly for file import from and export to PCs	Moderate
	GEM	Xerox Corp.'s Ventura Publisher graphic files	Mainly for file import from and export to PCs	Low to moderate
Data-oriented/numeric files (spreadsheets and data bases)	Binary Interchange File Format (BIFF)	Native mode of Microsoft Excel	Very high	Minimal
	Symbolic Link (SYLK)	Microsoft's Multiplan spreadsheet applications	Moderate	Moderate
	Data Interchange Format (DIF)	From early 1980s; Computer Associates International, Inc.'s SuperCalc format	Moderate, declining	Moderate, declining
	Worksheet (WKS)	Lotus 1-2-3 Release 1A	Extremely high	Extremely high
	WK1 (successor version to WKS)	Lotus 1-2-3 Release 2 and Symphony	Very high	Very high
	Data base Format, second and third versions (DBF, DB1 and DB2)	Ashton-Tate's dBase, dBase II and dBase III	Moderate	Very high
	Comma-Separated Values (CSV), Tab Values and Tab Text	Default use when native file format is not supported by application	Least common denominator data exchange method; unreliable for data structures such as spreadsheet formulas	Least common denominator data exchange method; unreliable for data structures such as spreadsheet formulas

(1) Primarily DOS, but increasingly includes Microsoft Windows.

The formats in this chart do not represent an exhaustive listing of IBMPC and Apple Computer Macintosh file formats; there may be others of varying prevalence, and some may be known by variant names.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.; AND DATAVIZ, INC., THUMBALL, CONN.

(continued from page 37)

3Com Corp. is further along than Novell in terms of Macintosh connectivity.

3Com last summer began shipping its version of the equivalent 386 server Macintosh support software, 3 + Open for Macintosh. This new software runs solely on the 3 + Open 386 server, which comprises 3Com's LAN Manager-based networking applications that run on top of the OS/2 operating system.

AT&T followed suit last month by delivering its StarGroup Server for Macintosh software, which loads and runs along with the StarGroup LAN Manager Server in an AT&T 80386- or 80486-based

StarGroup server. The StarGroup server software consists of AT&T's adaptation of Microsoft Corp.'s LAN Manager, which it runs on top of Unix System V.

In their efforts to bring the two worlds together, AT&T, Novell and 3Com have taken essentially the same approach. They have implemented the full AppleTalk protocol stack in a software module that runs on their respective servers.

This module handles access to the server from a Macintosh or from other AppleTalk client systems that connect to the server via an Ethernet, token-ring or LocalTalk LAN.

When running the AppleTalk

module, each of these servers appears to Macintosh clients as AppleTalk file servers. The full AppleTalk protocol stack, including the AppleTalk Filing Protocol at the top layer, is implemented and supported.

All three vendors strongly support both DOS and OS/2, but they support Unix and Transmission Control Protocol/Internet Protocol clients to varying degrees.

Limitations

The product materials of these three LAN operating system vendors include relatively few details on the degree of Macintosh-to-personal computer interopera-

bility provided in the server packages. Indeed, some users are both confounded and disappointed when they learn of the packages' limitations. For example:

- Connected Macintoshes do not directly communicate with DOS- or OS/2-based personal computers. Both types of clients can deposit and collect files from the server, including each other's files. But like two customers served by the same video rental store, the exchange is not directly between clients. Instead, files on a LAN server, like rental videotapes, are deposited by one client and accessed by another.
- Macintosh and personal computer clients can retrieve from

the server files that contain applications (in binary or object code form) and run those applications on their client systems. But Macintosh clients typically do not — and, for the most part, cannot — launch and run applications on the server, which is typically 80286- or 80386-based.

Currently, Macintoshes and personal computers that need to perform data base processing will access the server, download a Macintosh or personal computer data base program along with data files in the specific format for that application, and then run the entire package locally. This may also generate megabytes of
(continued on page 40)



ETHERNET-TO-

TOKEN-RING

BRIDGES

Beyond the LAN boundary

CONTINUED FROM PAGE 1

made available as a software option in routers and, still more recently, in the products provided by LAN operating system vendors. But gateways, routers and solutions based on LAN operating systems have drawbacks.

There is, however, a little-known fourth alternative for network managers who demand an inexpensive way to link token-ring and Ethernet LANs. It is an Ethernet-to-token-ring media access control (MAC)-layer bridge.

Currently, users that opt for this solution have a limited num-

ber of vendors from which to choose; only three vendors offer these bridges. But industry analysts believe that the number of Ethernet-to-token-ring bridge vendors will more than double this year, and the resulting competition may offer users additional features and, possibly, declining prices.

Vendors now offering Ethernet-to-token-ring bridges are CrossComm Corp., IBM and Ungermann-Bass, Inc. Sometime this year, firms such as Cabletron Systems, Inc., Digital Equipment Corp. and SynOptics Communi-

cations, Inc. are expected to provide new Ethernet-to-token-ring capabilities at the MAC sublayer through existing physical-layer interconnection products called "intelligent hubs," according to a consultant who asked not to be identified because of his close relations with these firms. (For more information on the MAC

sublayer, see "Making the MAC layer more clear," page 44.)

The need for links

The importance of Ethernet-to-token-ring connectivity to U.S. organizations is evident from figures compiled in a survey conducted early last year by International Data Corp. of Framingham, Mass., sponsored by Network World, Inc., publisher of *Network World*.

In a poll of more than 24,000 computer equipment users, more than 12,000 sites were found to
(continued on page 41)

CHART • GUIDE

A Buyer's Guide chart comparing Ethernet and token-ring bridges is on page 41.

Forwarding and converting frames at the media access control layer is a hot new bridge capability.



(continued from page 38)

network traffic — just so the client can derive the 20 or 30 bytes of specific information that it seeks.

Some newly emerging, advanced applications — notably, SQL data base management systems — are designed to run on a server, taking advantage of its considerable processing power and eliminating much of this client-to-server network traffic. But simultaneous access support for both Macintosh and personal computer client systems is not yet widely available.

Simultaneous Macintosh and personal computer client access to server-based applications and data bases is unquestionably the shape of things to come. However, some roadblocks may delay the widespread availability of such packages for a year or two.

One obstacle that LAN Manager-based LAN operating system vendors often cite is the Macintosh's lack of support for Named Pipes, LAN Manager's primary client/server application link.

Vendors are working to clear that hurdle. "Our Mac engineering group is actively pursuing support for Named Pipes on a Mac client," says Edward Schreyer,

board. Such a product is available from PerfecTek Corp. of Milpitas, Calif., in its Mac/DOS line of co-processor boards, which cost from \$695 to \$1,595. This type of board usually comes with special software that enables the user to run both personal computer and Macintosh programs from the same Macintosh interface screen.

There are some practical uses for this product, but in most cases, there are more elegant ways of achieving the same result. What's more, the availability of inexpensive personal computer clones makes simply adding a personal computer at such locations a viable alternative. Buying a personal computer and a Macintosh is only slightly more expensive than buying a personal computer to put in a Macintosh.

Two criteria

In order for personal computers and Macintoshes to be able to process the same data, one of two situations must exist. First, both systems must run the equivalent versions of the same application program.

Alternately, both systems can run similar function packages such as word processing or spreadsheets, as long as one of them can translate data files between the format used by the Macintosh application and the format used by the functionally similar application running on the personal computer.

At last count, there were 50 to 60 different application file formats in widespread use by popular Macintosh and personal computer application programs (see chart, page 38). Translators between some of these formats are available, and some progress is being made in the software industry toward embedding translators within application programs.

There are now more than a handful of word processing applications, a few spreadsheet programs, an integrated package or two, and at least one data base manager (FoxBase+, from Perysburg, Ohio-based Fox Software, Inc.) that are available in both Macintosh and personal computer versions.

Ashton-Tate's dBase IV is another data base manager that will reportedly soon be capable of running on server-based operating systems such as 3+Open, simultaneously supporting both DOS and Macintosh clients. And Apple says that Claris Corp., its application software subsidiary, is preparing both DOS and X Window System versions of its leading, currently Apple-only, applications, including MacWrite II and MacDraw II.

Beyond the server

Network and system managers may find it difficult to get their Macintosh and personal computer users to abandon their familiar applications. The opti-

mal solution, then, is file translation.

A server that handles a mix of Macintosh and DOS clients seems a logical place for this translation.

But oddly enough, and probably unfortunately for users, the leading LAN operating system vendors have been exhibiting little or no desire to add such application- and file-specific conversion or translation capabilities to their server packages.

Instead, translators are increasingly being built into specific applications. Some vendors say they think that's where it belongs. "File translation is most

translation software is included in every version of Sitka's TOPS network operating system. For years, TOPS has been the leading network software package for linking Macintoshes and personal computers, enabling primarily peer-to-peer file transfer. DataViz provides the translation software that Sitka includes with TOPS.

For now, it seems that file translation offers the best hope for users seeking to interwork Macintoshes and personal computers. But new application file formats are proliferating faster than companies such as DataViz can handle them.

byte data file between two relatively sophisticated word processing applications: WordPerfect Version 5.1 (for the personal computer) and Microsoft's Microsoft Word Version 4.0 (for the Macintosh).

According to Fontana, such a translation, if performed by a Motorola 68030-based Macintosh II, takes about 1½ minutes. For the far slower Macintosh SE, which is more prevalent than the Macintosh II, the translation will take "a few minutes," he says.

In addition, the explosion of new file formats is making it almost impossible to write translators that convert with 100% fidelity, according to Fontana.

This means that mixed Macintosh and personal computer communities could begin to see an increasing number of file translation errors creeping into data files. These errors will result unless users begin planning now to ensure that their future Macintosh and personal computer applications either support the same file formats and data structures, or inherently contain the needed file translation capabilities.

Picking winners

The chart on page 38 contains a thumbnail summary of the leading file formats in use today. Because of the very different nature of applications and data files, the table is divided into three sections for the three most common data processing environments: word processing and text files, graphics and print files, and data-oriented files.

The chart also shows the relative prevalence and importance of each format to both types of microcomputer environments. This assessment is based in part on the prevalence of applications using the particular file format and in part on user demand for translation to or from the particular file format. The relative assessment of file translation demand comes from DataViz.

Based on their organizations' current and projected mix of personal computers and Macintoshes, users should be able to compile a relatively small set of file formats that can accommodate both the applications now running and new applications being considered.

The Mac-to-PC future

Both MIS and network managers, especially those supporting mixed Macintosh and personal computer user communities, will increasingly need to monitor the file format structure and backward compatibility supported by new applications.

Although new formats will continue to proliferate, some new developments promise to enhance the chances for Macintosh-to-personal computer interoperability in the years ahead.

(continued on page 44)

Net managers
may find it difficult to get users to abandon familiar applications.



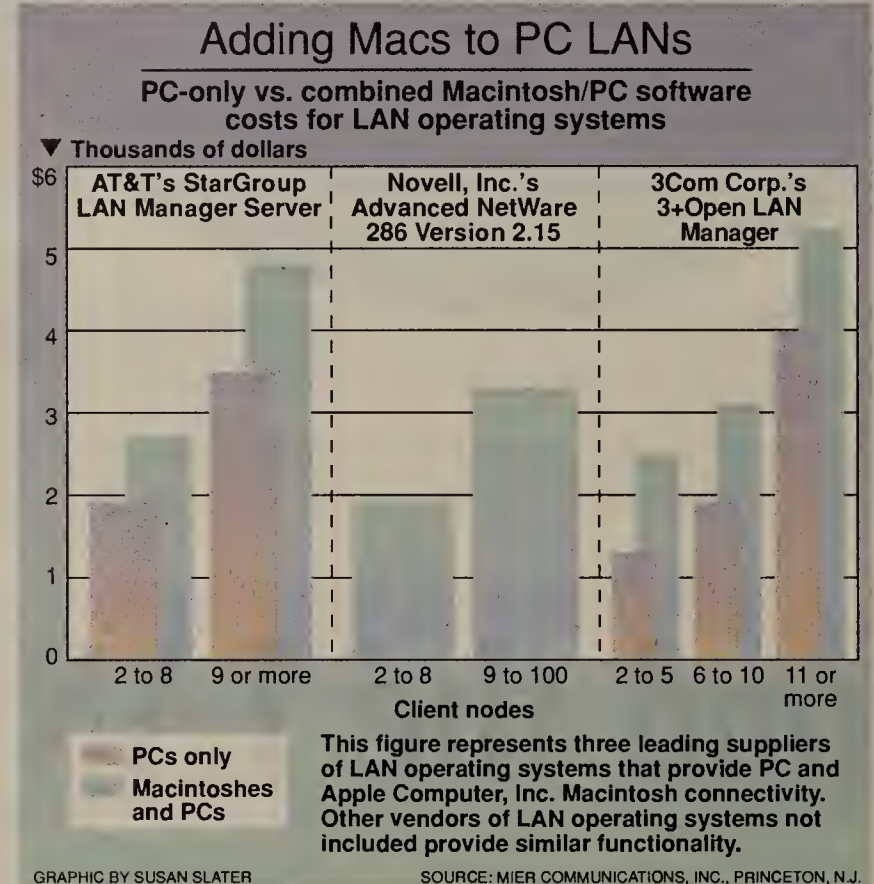
3Com's Macintosh product manager. But finding a way to do this won't be easy. "The [server application] has to be accessible from both Macs and PCs," he says.

For the most part, Macintoshes and personal computers cannot retrieve and run the same application files. Executable application programs are written to run either on a personal computer's Intel Corp. processor (8088, 80286, 80386 and so on) or a Macintosh's Motorola, Inc. processor (68000, 68030 and so on).

No single program today can run on both, but a third-party software package for the Macintosh — SoftPC, sold by Insignia Solutions, Inc. of Sunnyvale, Calif. — enables it to load and run some DOS programs.

This product currently costs around \$250. However, no performance data on its speed or accuracy as compared with running the same program on a personal computer was available at press time.

It is possible to buy and plug into a Macintosh II what is essentially a personal computer on a



Notes on LAN operating systems

AT&T's StarGroup LAN Manager Server	Novell, Inc.'s Advanced NetWare 286 Version 2.15	3Com Corp.'s 3+Open LAN Manager
<ul style="list-style-type: none"> Apple Computer, Inc. Macintoshes require addition of StarGroup Server for Macintosh. Requires Unix System V (not included). Includes DOS, OS/2 client software (none required for Macintoshes). Does not include any other protocol-support, gateway options. 	<ul style="list-style-type: none"> Includes NetWare for Macintosh. Includes DOS, OS/2 client software (none required for Macintoshes). Currently, Novell 386 does not offer direct Macintosh support; customers must buy and install NetWare 286 for NetWare for Macintosh gateway to access 386 server. NetWare Loadable Module support for Macintoshes/AppleTalk on 386 server expected in first quarter 1991. 	<ul style="list-style-type: none"> Includes OS/2 Standard Edition operating system. Macintoshes require addition of 3+Open for Macintosh. Includes DOS, OS/2 client software (none required for Macintoshes).

GRAPHIC BY SUSAN SLATER SOURCE: MIER COMMUNICATIONS, INC., PRINCETON, N.J.

useful as you're about to use the file," says Dick Fontana, president of Trumbull, Conn.-based DataViz, Inc. With the DataViz translators, Macintosh and personal computer users running similar but different applications can import, work on and then export files containing the same data.

The need for Macintosh-to-personal computer file translation is so great, in fact, that trans-

"People want to use this new stuff, mixed text and graphics, and so on," Fontana says. "And in a few years, they'll be adding [digitized, recorded audio or voice] sound" to the applications and data files.

One impact of this additional complexity is the time and processing power needed to translate data files between two different applications. For example, consider the translation of a 60K-

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1 Industry: (check one only)

- 01. ☐ Manufacturers (other than computer/communications)
- 02. ☐ Finance/Banking
- 03. ☐ Insurance
- 04. ☐ Real Estate
- 05. ☐ Healthcare Services
- 06. ☐ Legal
- 07. ☐ Hospitality
- 08. ☐ Retail/Wholesale Trade
- 09. ☐ Transportation
- 10. ☐ Utilities
- 11. ☐ Education
- 12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
- 13. ☐ Government State/Local
- 14. ☐ Government Federal
- 15. ☐ Military
- 16. ☐ Aerospace
- 17. ☐ Consultants (independent)
- 18. ☐ Carriers
- 19. ☐ Interconnects
- 20. ☐ Manufacturers (Computer/Communications)
- 21. ☐ VAR/VAD/Systems House
- 22. ☐ Distributor, Computer Related
- 23. ☐ Distributor, Communications Related
- 24. ☐ Other

2 Job function: (check one only)

- 1. ☐ Networking Management (Responsible for both voice & data)
- 2. ☐ MIS Management (VP, Dir., Department Head)
- 3. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
- 4. ☐ Data Communications Management (Responsible for data only)
- 5. ☐ Telecommunications Management (Responsible for voice only)
- 6. ☐ Financial Management
- 7. ☐ Engineering Management
- 8. ☐ Consultant (Independent)
- 9. ☐ Other

3 What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check one only)

- 1. ☐ Enterprise Wide (Organization/Subsidiary/Division)
- 2. ☐ Multi Enterprise (Consultants)
- 3. ☐ Department Wide

4 What is the total number of sites for which you have purchase influence?

- 1. ☐ 100+
- 2. ☐ 50-99
- 3. ☐ 20-49
- 4. ☐ 10-19
- 5. ☐ 2-9
- 6. ☐ 1

5 Your primary responsibility: (check one only)

- 1. ☐ Both Data + Voice
- 2. ☐ Data Networking Only
- 3. ☐ Voice Networking Only
- 4. ☐ None

6 Which transmission media do you use in your network: (check all that apply)

- Public:
 - 01. ☐ Switched-Based (DDD, Wats, Megacom, etc.)
 - 02. ☐ Leased Line (not including T-1)
 - 03. ☐ T-1
 - 04. ☐ Fractional T-1
 - 05. ☐ T-3/SONET
 - 06. ☐ Broadband
 - 07. ☐ ISDN
- Private:
 - 08. ☐ Satellite
 - 09. ☐ Microwave
 - 10. ☐ Fiber Optic

7 Is your network: (check all that apply)

- LOCAL AREA NETWORK
 - 1. ☐ Local (within building)
 - 2. ☐ Local (in a campus environment)
- WIDE AREA NETWORKS
 - 3. ☐ International
 - 4. ☐ National
 - 5. ☐ Regional (several states)
 - 6. ☐ Metropolitan

8 What is your network architecture? (check all that apply)

- 1. ☐ SNA
- 2. ☐ DECNET
- 3. ☐ OSI
- 4. ☐ GOSIP
- 5. ☐ MAP/TOP
- 6. ☐ TCP/IP
- 7. ☐ DCA (UNISYS)
- 8. ☐ OTHER

9 What is your LAN Operating System? (check all that apply)

- 01. ☐ 3COM (3+, 3+ open)
- 02. ☐ LOCAL TALK (APPLETALK)
- 03. ☐ BANYAN (VINES)
- 04. ☐ DCA (IRMALAN)
- 05. ☐ IBM (LAN Server)
- 06. ☐ IBM (PC LAN PROGRAM)
- 07. ☐ MICROSOFT (LAN MANAGER)
- 08. ☐ UNGERMAN BASS (NET/1)
- 09. ☐ NOVELL (NETWARE)
- 10. ☐ TOPS
- 11. ☐ PROTEON (PRONET)
- 12. ☐ OTHER

10 What is your LAN environment? (check all that apply)

- 1. ☐ 4M TOKEN RING
- 2. ☐ 16M TOKEN RING
- 3. ☐ ARCNET
- 4. ☐ ETHERNET
- 5. ☐ STARLAN
- 6. ☐ FDDI
- 7. ☐ LOCALTALK
- 8. ☐ 10BASET
- 9. ☐ OTHER

11 Which operating systems do you utilize? (check all that apply)

- 1. ☐ IBM DOS (VSE)
- 2. ☐ UNIX
- 3. ☐ OS/2
- 4. ☐ OS/2 Extended Edition
- 5. ☐ MVS
- 6. ☐ VM
- 7. ☐ VMS
- 8. ☐ XENIX
- 9. ☐ PICK
- 0. ☐ OTHER

12 Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAINFRAMES A	MINIS B
01. DEC		
02. IBM		
03. AMDAHL		
04. AT&T		
05. BULL HN IS		
06. NCR		
07. DATA GENERAL		
08. WANG		
09. HEWLETT PACKARD		
10. PRIME		
11. TANDEM		
12. UNISYS		
13. CONTROL DATA		
14. OTHER		

13 Please indicate by vendor the number of microcomputers/workstations:

- A. Presently installed in your network.
- B. The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER/ WORKSTATION/ VENDOR	PRESENTLY INSTALLED A	PLAN TO INSTALL NEXT 12 MONTHS B
01. PCs based on 80286 chip		
02. PCs based on 80386 chip		
03. PCs based on 80486 chip		
04. 8086/8088		
05. Macintosh		
06. RISC-based workstations		
07. UNIX-based workstations		

14 What is your planned PC standard? (check all that apply)

- 1. ☐ EISA
- 2. ☐ MCA
- 3. ☐ NUBUS (MACINTOSH)

15 For which areas outside of the U.S. do you have purchasing influence? (check all that apply)

- 1. ☐ Europe
- 2. ☐ Asia
- 3. ☐ South America
- 4. ☐ Australia
- 5. ☐ Middle East

16 Check ALL that apply in columns A and B

- A) I am presently involved in the purchase process for the following products/services:
- B) I plan to purchase the following products/services in the next 12 months:

Presently Involved A	Plan to Purchase B	
01. <input type="checkbox"/>	<input type="checkbox"/>	LOCAL AREA NETWORKS:
02. <input type="checkbox"/>	<input type="checkbox"/>	Local Area Networks
03. <input type="checkbox"/>	<input type="checkbox"/>	LAN Servers
04. <input type="checkbox"/>	<input type="checkbox"/>	LAN Services
05. <input type="checkbox"/>	<input type="checkbox"/>	Cables, Connectors, Baluns
06. <input type="checkbox"/>	<input type="checkbox"/>	Bridges, Routers, Gateways
07. <input type="checkbox"/>	<input type="checkbox"/>	UPS
	<input type="checkbox"/>	LAN Storage Devices
A	B	COMPUTERS/PERIPHERALS:
08. <input type="checkbox"/>	<input type="checkbox"/>	Micros
09. <input type="checkbox"/>	<input type="checkbox"/>	Minis
10. <input type="checkbox"/>	<input type="checkbox"/>	Mainframes
11. <input type="checkbox"/>	<input type="checkbox"/>	Front End Processors
12. <input type="checkbox"/>	<input type="checkbox"/>	Terminals
13. <input type="checkbox"/>	<input type="checkbox"/>	Laptops
14. <input type="checkbox"/>	<input type="checkbox"/>	Printers
15. <input type="checkbox"/>	<input type="checkbox"/>	Work Stations
16. <input type="checkbox"/>	<input type="checkbox"/>	Cluster Controllers

(continued on next column)

Presently Involved A	Plan to Purchase B	
17. <input type="checkbox"/>	<input type="checkbox"/>	SOFTWARE:
18. <input type="checkbox"/>	<input type="checkbox"/>	Network Management
19. <input type="checkbox"/>	<input type="checkbox"/>	Micro to Mainframe
20. <input type="checkbox"/>	<input type="checkbox"/>	Network Security
21. <input type="checkbox"/>	<input type="checkbox"/>	Call Accounting
22. <input type="checkbox"/>	<input type="checkbox"/>	Distributed DBMS
23. <input type="checkbox"/>	<input type="checkbox"/>	Communications Software
24. <input type="checkbox"/>	<input type="checkbox"/>	Applications Software
25. <input type="checkbox"/>	<input type="checkbox"/>	Network Operating Systems Software
26. <input type="checkbox"/>	<input type="checkbox"/>	EDI Software
	<input type="checkbox"/>	E-Mail Software
A	B	DATA COMMUNICATIONS:
27. <input type="checkbox"/>	<input type="checkbox"/>	Modems (over 9.6kbps)
28. <input type="checkbox"/>	<input type="checkbox"/>	Modems (under 9.6kbps)
29. <input type="checkbox"/>	<input type="checkbox"/>	T-1 Multiplexers
30. <input type="checkbox"/>	<input type="checkbox"/>	T-3 Multiplexers
31. <input type="checkbox"/>	<input type="checkbox"/>	Fractional T-1 Multiplexers
32. <input type="checkbox"/>	<input type="checkbox"/>	Data Switches
33. <input type="checkbox"/>	<input type="checkbox"/>	Matrix Switches
34. <input type="checkbox"/>	<input type="checkbox"/>	Packet Switches
35. <input type="checkbox"/>	<input type="checkbox"/>	Protocol Converters
36. <input type="checkbox"/>	<input type="checkbox"/>	Network Management Systems
37. <input type="checkbox"/>	<input type="checkbox"/>	Terminal Emulation Boards
38. <input type="checkbox"/>	<input type="checkbox"/>	Facsimile Machines
39. <input type="checkbox"/>	<input type="checkbox"/>	Diagnostic Test Equipment
40. <input type="checkbox"/>	<input type="checkbox"/>	DSU/CSU
41. <input type="checkbox"/>	<input type="checkbox"/>	Data Security
42. <input type="checkbox"/>	<input type="checkbox"/>	Data Compression Equipment
43. <input type="checkbox"/>	<input type="checkbox"/>	Network Adapter Boards
44. <input type="checkbox"/>	<input type="checkbox"/>	Microwave
45. <input type="checkbox"/>	<input type="checkbox"/>	Messaging Software
A	B	TELECOMMUNICATIONS:
46. <input type="checkbox"/>	<input type="checkbox"/>	PBXs (over 1000 lines)
47. <input type="checkbox"/>	<input type="checkbox"/>	PBXs (200 - 1000 lines)
48. <input type="checkbox"/>	<input type="checkbox"/>	PBXs (under 200 lines)
49. <input type="checkbox"/>	<input type="checkbox"/>	Key Systems
50. <input type="checkbox"/>	<input type="checkbox"/>	Automatic Call Distributors
51. <input type="checkbox"/>	<input type="checkbox"/>	Voice Messaging Systems
52. <input type="checkbox"/>	<input type="checkbox"/>	Video Teleconferencing Systems
A	B	SERVICES:
53. <input type="checkbox"/>	<input type="checkbox"/>	Switched Voice
54. <input type="checkbox"/>	<input type="checkbox"/>	Dedicated Leased Line
55. <input type="checkbox"/>	<input type="checkbox"/>	T-1
56. <input type="checkbox"/>	<input type="checkbox"/>	T-3
57. <input type="checkbox"/>	<input type="checkbox"/>	Digital Data
58. <input type="checkbox"/>	<input type="checkbox"/>	Packet Switched
59. <input type="checkbox"/>	<input type="checkbox"/>	Centrex
60. <input type="checkbox"/>	<input type="checkbox"/>	Central Office Lan
61. <input type="checkbox"/>	<input type="checkbox"/>	Satellite
62. <input type="checkbox"/>	<input type="checkbox"/>	On-Line Information
63. <input type="checkbox"/>	<input type="checkbox"/>	ISDN
64. <input type="checkbox"/>	<input type="checkbox"/>	E-Mail
65. <input type="checkbox"/>	<input type="checkbox"/>	VSAT

17 Estimated value of networking equipment and services:

A: Which you helped specify, recommend or approve in the last 12 months?

B: Which you plan to help specify, recommend or approve in the next 12 months?

- A B
- 1 ☐ ☐ \$100 million and over
- 2 ☐ ☐ \$50 - \$99.9 mill
- 3 ☐ ☐ \$25 - \$49.9 mill
- 4 ☐ ☐ \$20 - \$24.9 mill.
- 5 ☐ ☐ \$10 - \$19.9 mill.
- 6 ☐ ☐ \$5 - \$9.9 mill.
- 7 ☐ ☐ \$1 - \$4.9 mill.
- 8 ☐ ☐ \$500,000 - \$999,999
- 9 ☐ ☐ Under \$500,000

18 Estimated gross annual revenue of your entire company/institution: (check one only)

- 1. ☐ over \$10 billion
- 2. ☐ \$1 to \$9.9 bill.
- 3. ☐ \$500 to \$1 bill.
- 4. ☐ \$100 to \$499.9 mill.
- 5. ☐ \$50 to \$99.9 mill.
- 6. ☐ \$10 to \$49.9 mill.
- 7. ☐ \$5 to 9.9 mill.
- 8. ☐ under \$5 mill.

19 Estimated number of employees for your entire corporation:

- 1. ☐ over 10,000
- 2. ☐ 5,000 - 9,999
- 3. ☐ 2,500 - 4,999
- 4. ☐ 1,000 - 2,499
- 5. ☐ 500 - 999
- 6. ☐ under 500

20 Which of the following ISDN products do you plan to purchase in the next 12 months? (check all that apply)

- 1. ☐ Basic Rate Interface Terminal Adapters
- 2. ☐ Primary Rate Interface Equipment
- 3. ☐ Voice/Data terminals
- 4. ☐ Voice-only terminals
- 5. ☐ Data-only terminals

21 From which of the following vendors will you consider buying your PBX/Central Office Switch? (check all that apply)

A PBX	B COS	
A <input type="checkbox"/>	<input type="checkbox"/>	AT&T
B <input type="checkbox"/>	<input type="checkbox"/>	ALCATEL
C <input type="checkbox"/>	<input type="checkbox"/>	ERICSSON
D <input type="checkbox"/>	<input type="checkbox"/>	FUJITSU
E <input type="checkbox"/>	<input type="checkbox"/>	HARRIS
F <input type="checkbox"/>	<input type="checkbox"/>	HITACHI
G <input type="checkbox"/>	<input type="checkbox"/>	ROLM
H <input type="checkbox"/>	<input type="checkbox"/>	INTECOM
I <input type="checkbox"/>	<input type="checkbox"/>	MEMOREX TELEX
J <input type="checkbox"/>	<input type="checkbox"/>	MITEL
K <input type="checkbox"/>	<input type="checkbox"/>	NEC
L <input type="checkbox"/>	<input type="checkbox"/>	NORTHERN TELECOM
M <input type="checkbox"/>	<input type="checkbox"/>	SAMSUNG
N <input type="checkbox"/>	<input type="checkbox"/>	SIEMENS
O <input type="checkbox"/>	<input type="checkbox"/>	STROMBERG-CARLSON
P <input type="checkbox"/>	<input type="checkbox"/>	TOSHIBA
Q <input type="checkbox"/>	<input type="checkbox"/>	OTHER

NETWORK WORLD

The Newsweekly of Enterprise Networking Strategies

An IDG Publication

Ethernet-to-token-ring MAC-layer bridges

Company	Product	Token-ring interconnections	Number of link ports	Wide-area interfaces	Filtering rate (packet/sec)	Forwarding rate (packet/sec)	Type of bridge	Standard configuration	Price
CrossComm Corp. Marlborough, Mass. (508) 481-4060	ILAN	4M bit/sec, 16M bit/sec; works with any vendor's network interface card	4	V.35, RS-232, T-1, X.21, RS-422	13,500	4,000	User option, can operate as either an encapsulation or translation bridge	2 ports standard, 2 extra ports available	\$7,900
IBM Armonk, N.Y. (800) 426-2468	IBM 8209 LAN Bridge	4M bit/sec, 16M bit/sec	2	None	10,000 (for 64-byte packets)	3,000 (from Ethernet to 4M bit/sec token-ring, based on 64-byte packet size)	Translation	1 Ethernet port and 1 token-ring port	\$7,445
Ungermann-Bass, Inc. Santa Clara, Calif. (408) 496-0111	Access/One Ethernet Token-Ring Data Link Bridge	4M bit/sec token-ring adapter cards from all vendors	2	None	9,000	3,900	Translation	1 Ethernet port and 1 token-ring port	\$5,250

MAC = Media access control

This chart includes a representative selection of Ethernet-to-token-ring MAC-layer bridges. These vendors may offer other MAC bridges, and other vendors not included may offer a full range of competitive bridges.

SOURCE: NETWORK WORLD

Beyond the LAN boundary

continued from page 39

have either mainframes, mini-computers or personal computers. Of the sites surveyed, 50% have Ethernet LANs, 36% have token-ring LANs and 19% have both.

Most gateways are application-specific, says Mike Francini, senior product manager for inter-networking at Ungermann-Bass. He adds that such application-specific gateways limit the number of ports that can be used for simultaneous Ethernet-to-token ring transmissions. For instance, only 128 ports on a 3270 gate-

and Novell, Inc. NetWare on an Ethernet.

There are more than 80 bridge vendors in the U.S., but only a handful currently sell Ethernet-to-token-ring bridges.

Why so few? Designing the products is a complex task, and the apparent transparency of data that the user sees is belied by

destination address, followed by the source address. This is followed by the length field and the user's data.

If the data unit is smaller than the protocol requires it to be, the data field is extended by a number of extra bytes called a pad. Finally, there is a frame check sequence. The token-ring LAN format has a start frame delimiter, then a frame with access control and frame control information in the header. This is followed by the destination address and source address. Next comes the user data, which is followed by a frame check sequence. Then there is an end frame delimiter and frame status information.

When an Ethernet LAN is linked to a token-ring LAN, the information in the frame is altered and the Ethernet frame's frame check sequence, which acts as a check sum, needs to be recalculated.

An added complication is that Ethernet and token-ring LANs generally use different frame sizes. The maximum frame size is 1,500 bytes for Ethernet, 4K bytes for 4M bit/sec token ring and as much as 17.8K bytes for a 16M bit/sec token ring.

germann-Bass uses a technique called frame size negotiation on the token-ring side of its bridge.

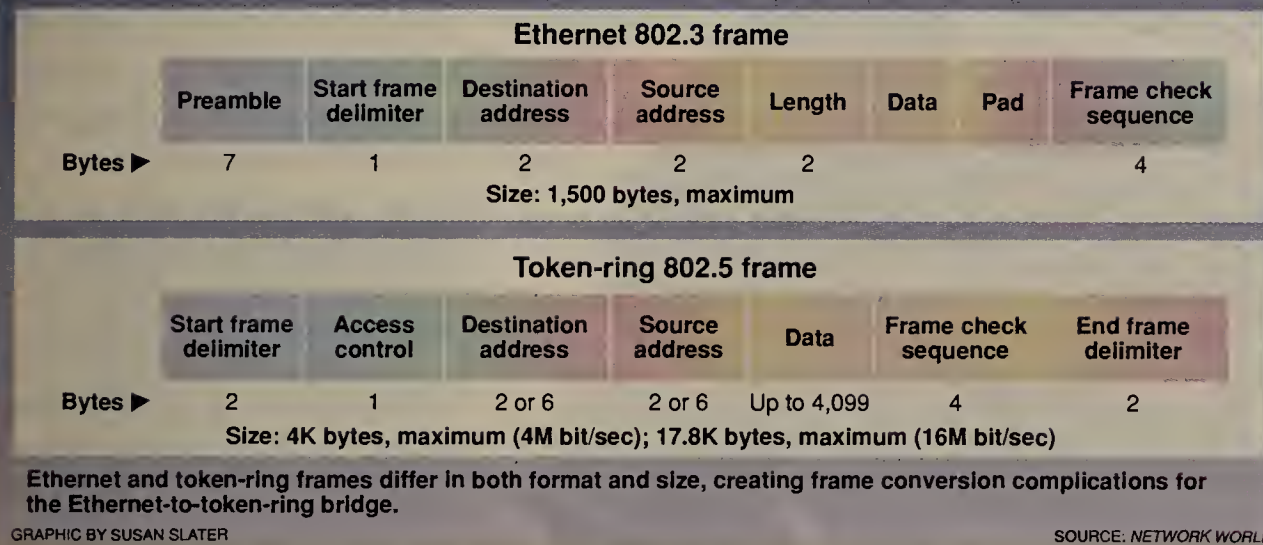
Whenever the bridge determines that a packet needs to pass through the bridge from the token-ring side to the Ethernet side, the bridge sends a packet back to the sending token-ring device telling the device that it must modify the frame size it sends so that it conforms to the Ethernet length standard.

The frame size negotiation process is done once per connection time. For example, instead of transmitting 4K-byte frames, the bridge will request that the sending device reduce them to 1,600 bytes.

After the packet fragmentation is done, there's the problem of maintaining destination address information across the bridge. "You have separate standards for bridging protocols," Rhodes says. Specifically, there's the Spanning Tree Protocol on the Ethernet side and source routing on the token-ring side.

Going from token ring to Ethernet can be handled by setting up a pseudo-ring number for the Ethernet side of the bridge. This allows the token-ring side of the bridge to talk to the Ethernet

Comparing Ethernet and token-ring frames



What is not clear is how many companies across the U.S. have both Ethernets and token rings.

However, it is likely to be a high percentage of the large-sized firms because many of them have not been able to insist upon a standard for the type of LAN to be used across the organization. Thus, the need for remote links between the two LAN types is probably high.

Using a gateway has a primary drawback: Quite a few LAN sites do not have the requisite mini-computer or mainframe needed to make full seven-layer conversion between protocols. The minicomputer or mainframe can be accessed remotely, but that involves creating one or more wide-area net links for both LANs to access the conversion host.

A little-discussed characteristic of existing gateways is that they are often store-and-forward in nature. Information is sent from a node on one LAN to the mainframe, which converts the formats, stores the information and then forwards it to a node on the other LAN, but only when the information is requested by that node.

way can be used at the same time, Francini says.

By contrast, a MAC-layer bridge has no port limitation. However, it naturally is constrained by the throughput, measured in packets per second, that the bridge can forward (see chart, this page).

Many routers offer the Ethernet-to-token-ring conversion feature. But for firms that don't need the routing capability, spending \$10,000 to \$30,000 for a router that merely performs conversion is an unjustifiable expense.

Instead, these firms may opt for the Ethernet-to-token-ring conversions offered by net operating system vendors. These solutions naturally run on LAN servers. And since many LANs now have servers, this is an attractive way of doing the conversion.

However, while LAN servers can convert from Ethernet to token ring and vice versa, they cannot convert between LAN operating systems. Thus, internetworks will not be able to establish connectivity if they consist of LANs with more than one operating system — such as LAN Manager on an IBM Token-Ring Network

the extensive amount of software required to both bridge the diverse LANs and handle protocol conversions in both directions, according to Paul Serrano, product line manager for inter-networking at SynOptics.

MAC-layer Ethernet-to-token-ring bridges perform two tasks that distinguish them from other bridges. They do the usual bridge functions of filtering and forwarding packets — determining whether a packet is addressed to a point inside the LAN and retaining it, or passing it through the bridge toward the external point.

In addition, Ethernet-to-token-ring bridges must convert packets between the two formats, a process known as frame conversion. These bridges must perform frame conversion while maintaining destination information. In other words, the destination information must be readable in Ethernet for token-ring packets, and vice versa.

Ethernet and token-ring LANs package data into very different frame formats (see graphic, this page). An Ethernet frame starts with a 7-byte preamble and a start frame delimiter. Next comes the

Application-specific gateways limit the number of ports for simultaneous Ethernet-to-token ring transmissions.



Therefore, if a 4K-byte or larger token-ring packet is sent to an Ethernet LAN, the token-ring packet must be broken into a number of packets that can fit on an Ethernet LAN. "That's the biggest problem when trying to connect the two types of LANs," says David Rhodes Jr., a consultant with Business Systems Group, Inc., a Houston-based systems integrator.

There are several ways around this dilemma. For example, Un-

side. When the packet crosses the bridge, the source routing information is stripped off in favor of standard transparent bridge information.

Going from the Ethernet side of a bridge to the token-ring side is considered more difficult. That's because the Ethernet side of the bridge has to maintain a table of addresses.

To build this table, the bridge traditionally sends out explor-

(continued on page 44)

IBM lets the Now 486 technology

Without the proper venue, dazzling ability often falls short of expectations. That's certainly been the case with the Intel 486™ microprocessor, a processor that hasn't been utilized to its full potential. So that's what IBM set out to do. Just as it takes a seasoned jockey to turn a thoroughbred into a champion, it took IBM to give the 486 processor every opportunity to work its genius. Introducing IBM Personal System/2® Model 90 XP 486 and Model 95 XP 486.

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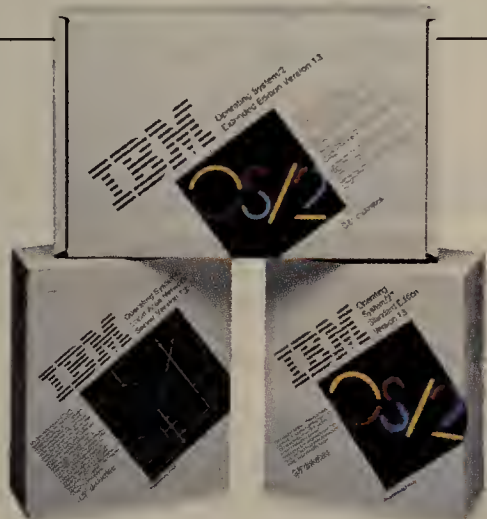


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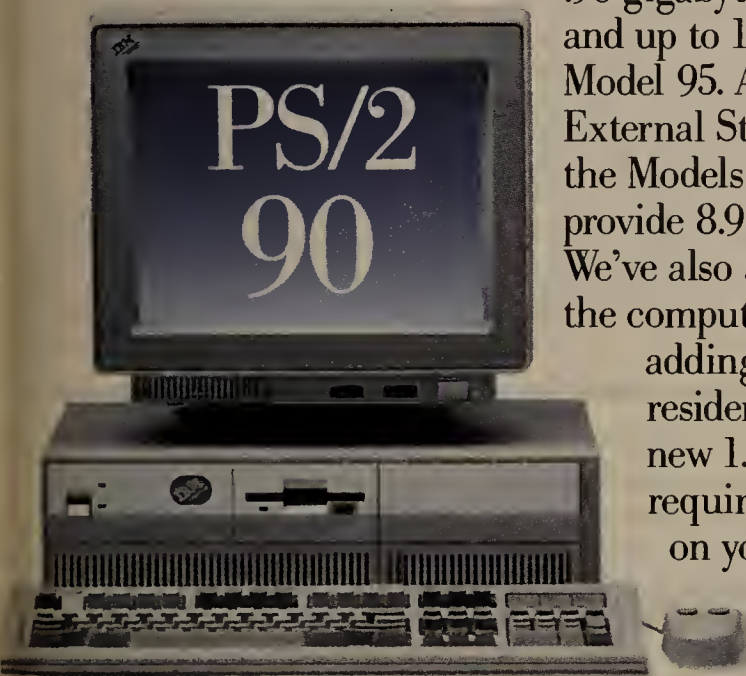
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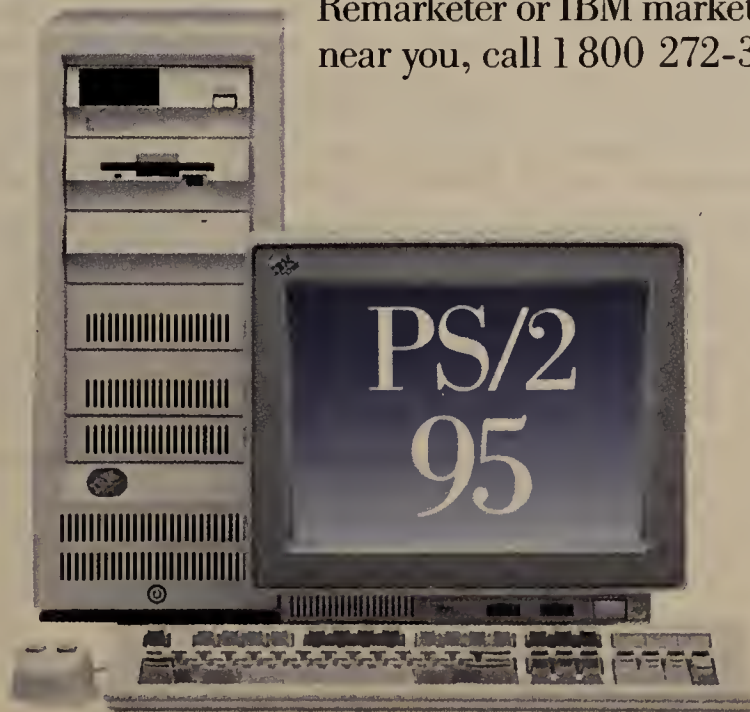
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Beyond the LAN boundary

continued from page 41

atory packets to learn where the devices reside on the network. With source routing on token-ring networks, the end stations just need to learn a route; the bridge does not maintain a data base of addresses.

Converting a packet from an Ethernet LAN to a token-ring packet means the token-ring side needs to maintain a data base of addresses and learn all the addresses on the network. This adds to the complexity of the bridge.

Another complication of trying to establish communications between Ethernets and token rings is the problem of network protocol consistency.

Current MAC-layer bridges can support several protocols, including Transmission Control Protocol/Internet Protocol and Novell's increasingly popular Internetwork Packet Exchange (IPX), but only one at a time.

Thus, both the Ethernet and token ring connected through the bridge must run the same protocol for the information to be transferred in a readable format.

Furthermore, MAC-layer bridges do not convert higher level protocols.

This means that no direct transmission can occur between the most popular of the protocols used on Ethernet — TCP/IP — and the most popular used on the token ring — the framing formats specified by IBM's Network Basic I/O System. However, when TCP/IP or IPX is used on both LANs, communications can be established.

While the absence of TCP/IP-to-NETBIOS translation is a significant drawback to inter-networking, it is no worse than having a router that supports only one protocol. Users that require this kind of translation may need to purchase a gateway.

Intelligent hubs

There are products that offer physical-layer connectivity between Ethernets and token rings. They are called hubs or, more commonly, intelligent hubs. However, used alone, these LAN hubbing devices do not allow Ethernet and token-ring LANs to communicate.

They perform neither translation nor bridging, but merely allow different types of LANs to share a common cable connection unit.

These hubs provide for centralized cable management — in a wiring closet, for example. This is a worthy goal but not by any means as important to the connectivity of different LAN types as MAC-layer bridges.

However, it is likely that some of the intelligent hubbing devices will be made considerably more intelligent and turned into MAC-layer bridges in the near future.

Companies offering hubbing devices include Cabletron and Syn-Optics — both of which are likely to offer Ethernet-to-token-ring bridges soon.

In evaluating these products, it is important to begin with the forwarding rate, measured in packets per second.

The 4,000 packet/sec that CrossComm's ILAN delivers leads all its competitors. But it is only 100 packet/sec faster than Ungermann-Bass' product, which costs \$2,650 less.

On the other hand, unlike other bridges, ILAN offers an extensive number of wide-area interfaces. In particular, it can be attached to a T-1 circuit.

The other bridges have no wide-area interface listed and are thus limited to local connections. ILAN can be used locally and remotely.

Also, ILAN's number of link ports — four vs. its competitors' two — is extremely cost-effective.

ILAN's listed filtering rate of 13.5K packet/sec is far faster than all other products listed. However, Ungermann-Bass' Access/One Ethernet Token-Ring Data Link Bridge is again quite cost-effective, with a filtering rate of 9K packet/sec and a low price of \$5,250.

It is worth noting that the IBM 8029 LAN Bridge is a software upgrade of IBM's token-ring-to-token-ring bridges. Therefore, users can take their IBM bridges that are not connecting two token rings and use them to tie together the two LAN types.

MAC-layer bridges are likely to grow more popular whenever the same protocols are run on different LANs at the same site.

There are two important trends to be considered here. With the popularity of Novell operating environments, the IPX protocol tends to be used on both Ethernets and token rings.

Similarly, Apple Computer, Inc.'s Macintosh computers now are being connected and hooked to printers not merely on the traditional AppleTalk LAN, but on Ethernets and token rings.

Of course, this serves only in Macintosh-to-Macintosh communications. True conversion of file formats, allowing applications to be passed between personal computers and Macintoshes, is another story (see "Making Macs work with PCs," page 37).

With a spate of new Ethernet-to-token-ring bridge products expected later this year, potential purchasers should think closely about whether to wait for the new equipment or purchase gear currently on the market.

In any case, users that want to connect networks that run the same protocols on both Ethernets and token rings should give some thought to routers and gateways, but the less expensive option of a bridge between the two LANs also merits consideration. ■

Making the MAC layer more clear

Media access control (MAC) is the lower of two sublayers that form the data link layer, or Layer 2, of the Open Systems Interconnection model. The other is Logical Link Control.

The MAC sublayer allows for data transfer using one of three media access options: Carrier Sense Multiple Access with Colli-

spanning Tree Algorithm. The 802.1d bridge will connect any standard 802 local-area network with any other.

For the various LANs, 802.1d bridges first use a standard technique called "flooding" to find out about their environment so that they can send and receive data. This means they flood the

which it subsequently refers to whenever it needs to forward a packet. Because the bridge accomplishes this configuration and learning process entirely without user intervention, this type of bridge is known as a transparent bridge.

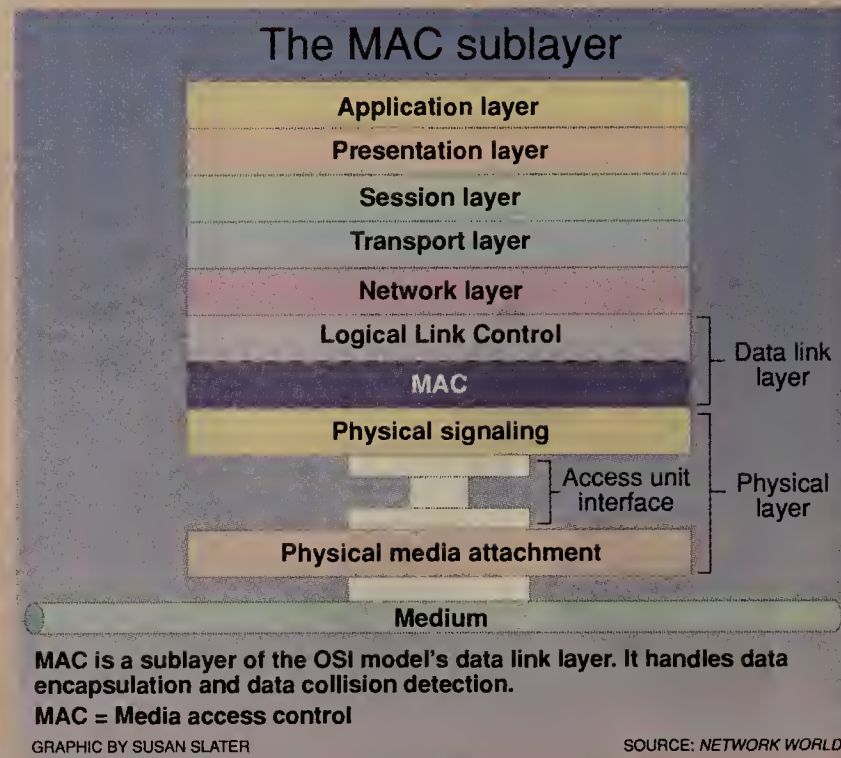
But one disadvantage of the 802.1d bridge is that it doesn't address the issues of translating Ethernet Version 2 to token ring or Fiber Distributed Data Interface to IEEE 802.3, says Floyd Backes, a member of the 802.1 Bridge Working Group and a principal software engineer at Digital Equipment Corp.

At its meeting last November in La Jolla, Calif., the 802.1 Bridge Working Group began devising a method of translating FDDI to 802.3, Backes says. "The technical meat of what was decided is very stable, and several vendors agreed after a handshake to go off and do it. It should progress quickly."

Most internetworked token-ring LANs use the 802.5 committee's source routing scheme, which relies partly on the network layer (Layer 3) of the OSI model.

Then, a few meetings ago, it was decided to define source routing as an optional enhancement to transparent bridging. This new type of bridge is called a source routing transparent bridge. "So in standards land," Backes says, "there's no such thing as a source routing-only bridge."

— Alison Conliffe



sion Detection (IEEE standard 802.3), a token access protocol on a bus topology (802.4) and a token access protocol on a ring topology (802.5).

In May of last year, the 802.1 committee of the Institute of Electrical and Electronics Engineers, Inc. approved a standard MAC-layer bridge, called the 802.1d bridge, which uses the

communications channel with messages. The result is that every bridge knows about every other bridge. The bridges are assigned numbers, and the bridge with the lowest number becomes the root of a tree, while the other bridges form branches.

Once the bridge learns the addresses of the other stations on the network, it builds a table,

Making Macs work with PCs

continued from page 40

Apple's new version of the Macintosh operating system, System 7.0, due this summer, contains a few new features that could enhance computer-to-computer interworkability. One is called the Edition Manager, which "lets you take [a data file] and publish it," according to Bill Brown, networking product manager with Apple. Whenever a file is distributed, the system software keeps track of where all the copies are, and any authorized changes to the file are automati-

cally made to all copies.

Another new component is an interprocess communications facility called Apple Events, which provides a standard, albeit rudimentary, messaging structure that application developers can use for consistent access to a Macintosh system or files.

Yet another development is a preliminary specification from Microsoft that defines a standard way to represent objects and convert between different object formats by applications. Known as "object loading and embedding," the concept seems to have attracted initial support from other major application suppliers.

Letters

continued from page 35

troubling omission in an otherwise fine story.

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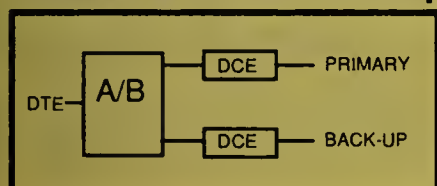
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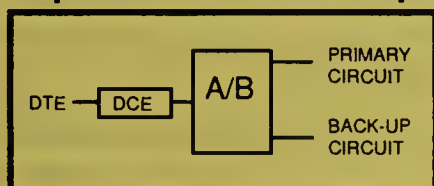
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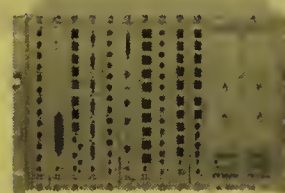


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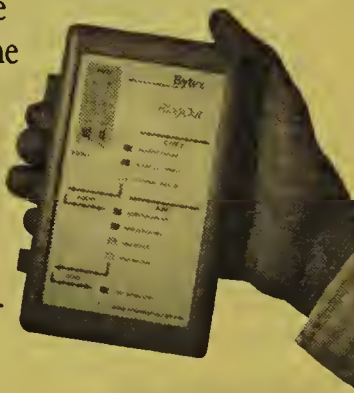
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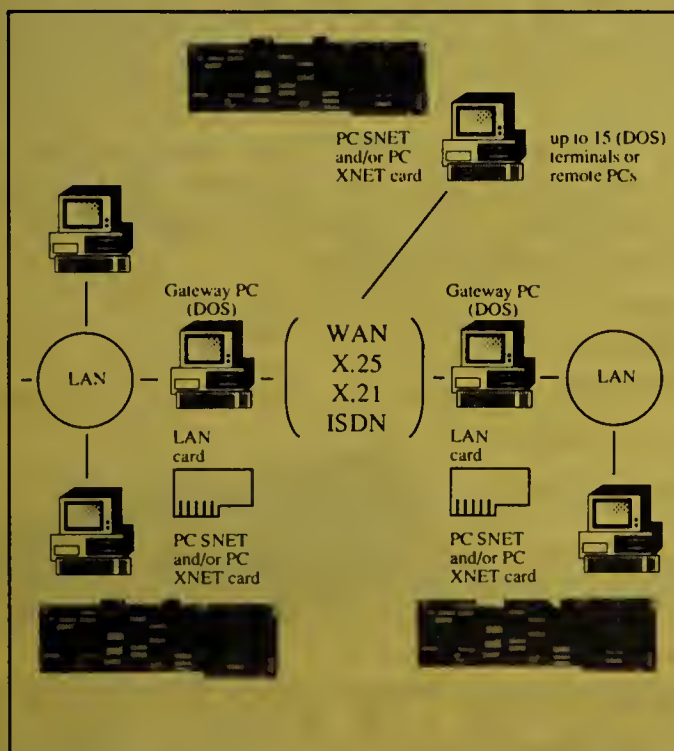


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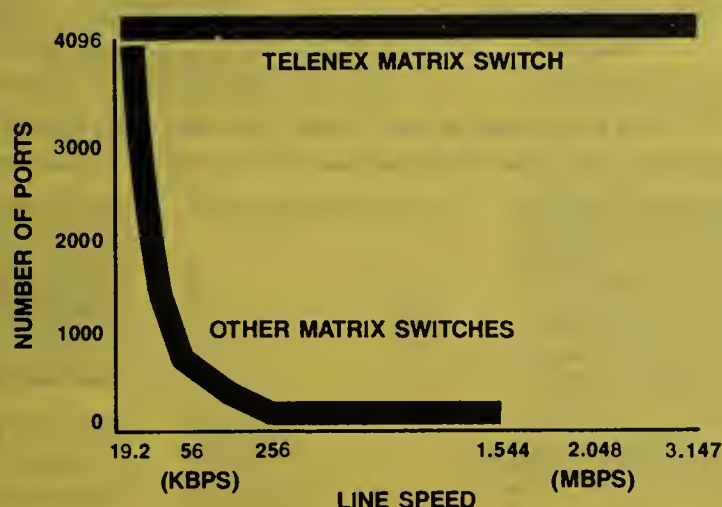
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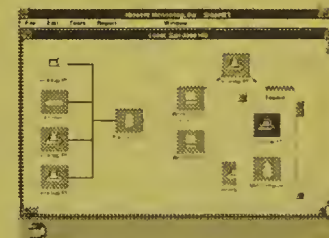
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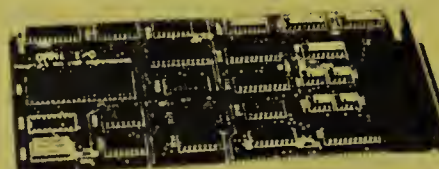


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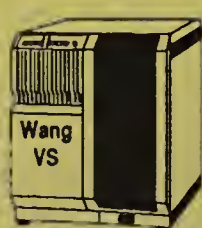
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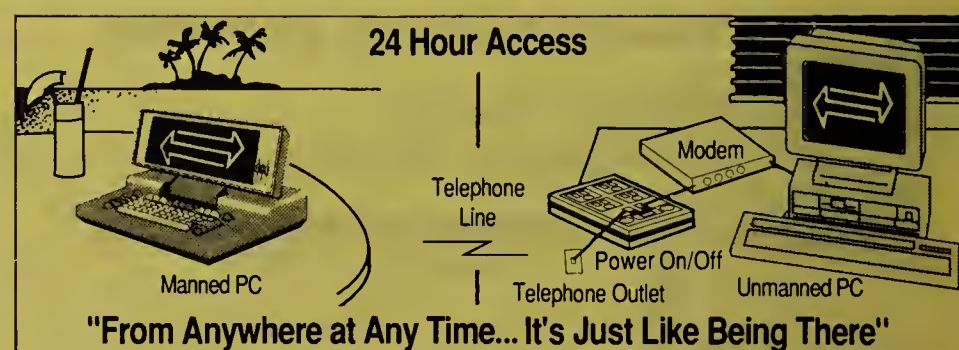
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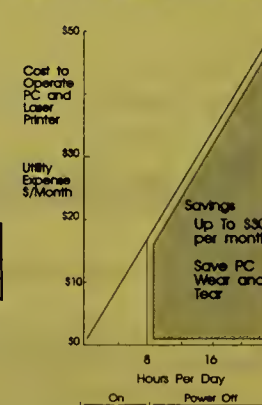


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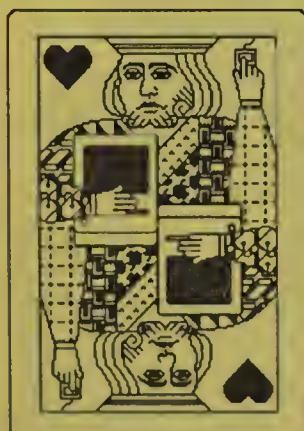
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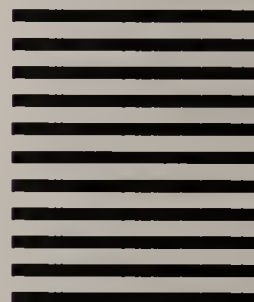
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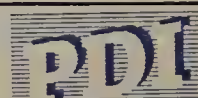


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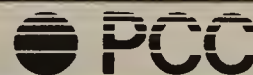
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Firm to link LANs to TCP/IP net

continued from page 17

er applications that existing mainframe applications cannot support, such as customized patient and personnel scheduling.

The LAN servers are currently outfitted with a Digital Communications Association, Inc. Irmalan gateway that enables microcomputers to emulate 3270 terminals. Those servers are directly linked to the host via a 19.2K bit/sec subchannel on a T-1 link. Only a few of the LANs are outfitted with DEC terminal-emulation software that lets microcomputers access the VAXcluster residing on the same Ethernet backbone.

With TCP/IP software running on the servers, Medlantic will be able to replace Irmalan and the VAX terminal-emulation software with TCP/IP's Telnet virtual terminal protocol, enabling microcomputer users to access either the IBM host or the VAXcluster.

"What we're hoping is that some of the departments that have their own little data bases to keep track of lab results won't need them anymore if we give them direct access to the VAXcluster data base through TCP/IP," Gaud said.

Reducing the application backlog

Medlantic is also banking on TCP/IP to help it cut back on the growing number of application support requests that LAN users are making to the IS department.

Even though the installation of LANs introduced a new software environment to Medlantic, the IS unit actually welcomed the addition of microcomputers that could run off-the-shelf software because it reduced its mainframe application backlog. "With three hospitals all demanding their own applications, it became cumbersome for us," Gaud said. "The PCs solved the issue."

However, the tide is turning. The IS department is increasingly being asked to develop data base applications that are more complex than those that LAN users can build themselves using the manuals furnished with off-the-shelf data base management systems.

"The same application backlog problems IS faced a few years ago is what the users of PCs are beginning to experience

now," Gaud said. "And as they encounter those problems, they request help from IS."

Medlantic wants to use TCP/IP to provide access to existing host-based applications that meet users' requirements as the first step in preventing the buildup of a microcomputer application backlog.

Flexibility is key

Gaud said the IS department decided to broaden its use of TCP/IP in 1989, after Medlantic upgraded an aging lab results system with a VAXcluster. At that time, the company successfully used TCP/IP software to eliminate the need to equip each hospital department with both 3270 and DEC VT-320 terminals.

TCP/IP was chosen because it is more flexible than the protocol converter that previously enabled 3270 terminal users to access lab results on the older system via the SNA network. For instance, TCP/IP will provide connectivity between the IBM host, VAXcluster and LANs, while a protocol converter only enables one vendor's terminal to access another's host.

Medlantic hopes TCP/IP will prove to be even more flexible by enabling microcomputers to access either host environment.

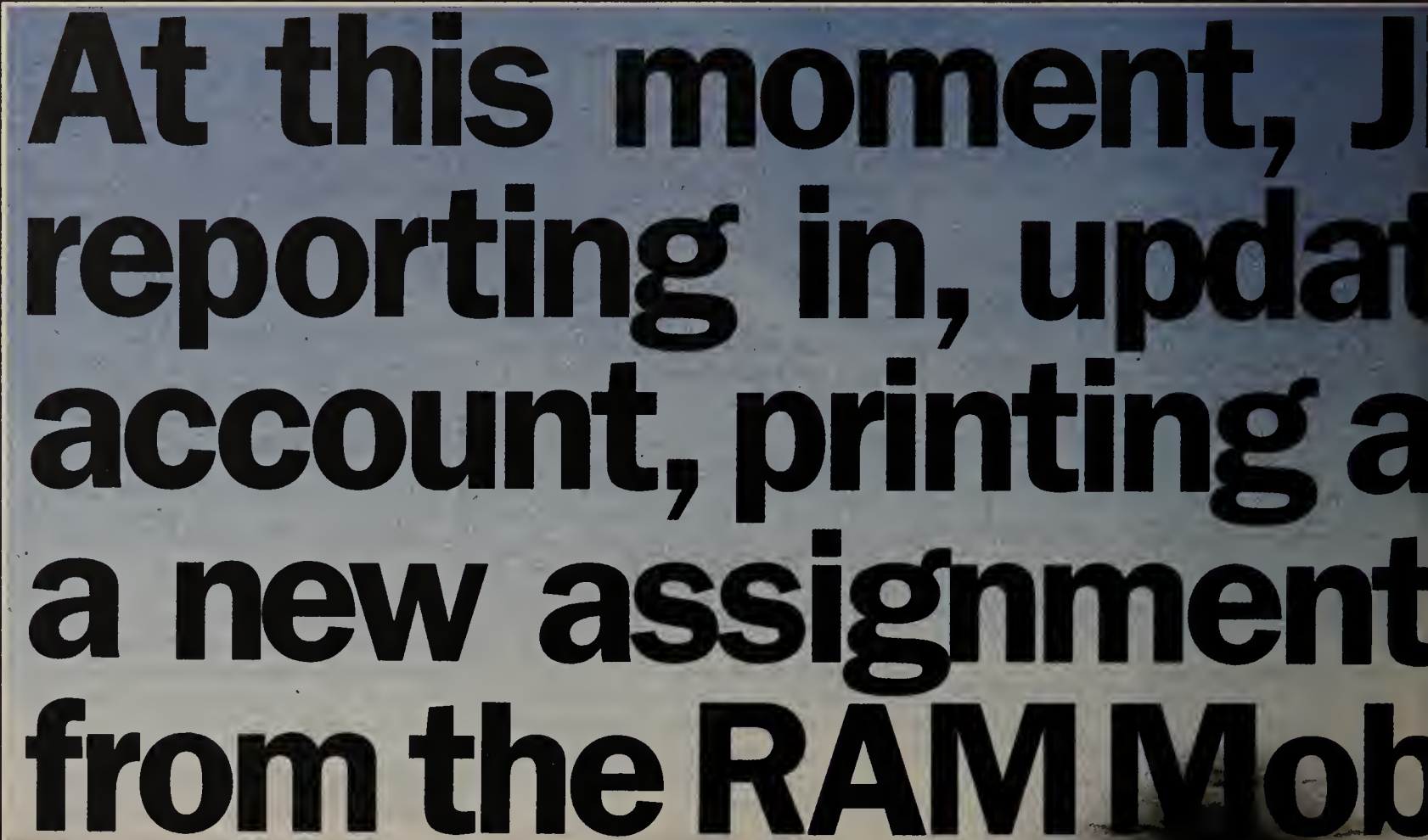
The TCP/IP software Medlantic selects to run on its servers will work with Interlink Computer Sciences, Inc.'s Software Network Solution/TCPaccess software running on the mainframe and VAXclus-

ter-based TCP/IP software acquired from The Wollongong Group, Inc.

The servers will be linked via Ethernet to the VAXcluster, which is in turn attached via a Cisco Systems, Inc. gateway to a 112K bit/sec subchannel on the T-1 network. A sister gateway at the data center provides access to an IBM 3745 front-end processor.

This approach will enable LAN-attached microcomputers to access either the VAXcluster or the IBM mainframe.

DEC terminals used by workers in Washington Hospital Center's lab, as well as the emergency room and critical care ward, also use that gateway to access the IBM host. The terminals are linked via DEC's DECserver 550 terminal servers and



At this moment, J reporting in, updat account, printing a a new assignment from the RAM Mob

Encryption device bows

continued from page 31

also distributes the codes to remote units.

The key center unit connects to a Compaq Computer Corp. personal computer running network management software from Racal-Milgo that monitors and controls the Datacryptor 64P units.

This net control feature enables network managers and security personnel to troubleshoot for problems with the encryption units and manage changes in operating modes.

According to Steve Rodney, section head of security products in Racal-Milgo's engineering department, the system can detect errors in the encryption chips and data circuitry.

The Datacryptor 64P is available now. List prices range from \$1,900 to \$2,400.

For more information, write to Racal-Milgo at P.O. Box 404044, Fort Lauderdale, Fla. 33340, or call (305) 846-1601. □

In today's fast-paced, "get it done yesterday and do it cheaper" marketplace, the only way for an organization to excel is through better, faster, and more economical ways of communicating.

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The RAM Mobile Data Network is designed for efficient data communications and computer-aided

Ethernet to the VAXcluster.

The 3270 terminals are linked via the IBM host and gateway to the VAXcluster. Medlantic attaches terminals via IBM cluster controllers to one of two Network Systems Corp. (NSC) channel extenders in the Washington Hospital Center. Those channel extenders are linked via a 50M byte/sec NSC Hyperchannel network to two 248K bit/sec subchannels on the T-1 circuit.

Channel extenders on another Hyperchannel network here are linked to three host channels. While traffic is spread equally across those channels, Hyperchannel enables Medlantic to reroute data destined for a failed channel to either of the two functioning ones. ☐

New NetView pricing favors central mgmt.

continued from page 15

Users that adhere to IBM's Communications Management Configuration (CMC) strategy, where a single host is dedicated to session management, are likely candidates for the centralized management scheme and many have already implemented it ("IBM serves up plan to centralize mgmt.," *NW*, July 24, 1989).

Such users benefited most from the September announcement because they were offered the new, less expensive Distributed System Option package, which could run on most of their mainframes. Recently, those users got a further break when IBM

announced it is cutting the price for most NetView Version 2 packages as compared to the prices announced in September for all but the smallest mainframes ("IBM's revamped NetView 2 price plan cuts user costs," *NW*, Dec. 24, 1990).

That has users like Larry vanGoethem, director of systems support and telecommunications at Sara Lee Corp. in Chicago, rethinking their net management strategies and considering the Distributed System Option at some remote sites.

"With the new pricing, you certainly do have to think about it, especially if you have some small machines," he said. Under the revised prices for Version 2, IBM said the cost of NetView for its smallest mainframes will be higher than the price

announced in September.

Sara Lee has 10 to 12 mainframes, each controlling an essentially separate network and each running NetView, vanGoethem said. His company will look at getting its divisions to cooperate more in terms of net management in order to cash in on potential NetView savings by using the Centralized System Option to support remote sites running the Distributed System Option.

But that presents an organizational problem for other users. Fidelity Investments, Inc. in Boston, for example, is made up of largely autonomous business units and is continually migrating toward a decentralized processing environment, said Frank Diasparra, vice-president of advanced technology at Fidelity's technology arm, Fidelity Systems Co.

"A model that I see evolving for network management is distributed network

m Adams is ing a customer's bill, and getting (with a little help ile Data Network).

"A model that I see evolving for network management is distributed network administrators" on a regional or local-area net level, Diasparra said.

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administrators" on a regional or local-area network level, Diasparra said. Under that scenario, the distributed NetView version does not help because it does not support the operator interface that local administrators need.

Atul Kapoor, vice-president of the consultancy Kaptronix, Inc. in Hawthorn, N.J., said large IBM customers generally fall into two categories: those with homogeneous corporate and computer environments — such as Sears, Roebuck and Co. — which employ the CMC configuration and will likely benefit from the distributed NetView option; and the others that are more distributed in nature and thus will have more difficulty realizing the price benefits that the Distributed System Option can provide, Kapoor said.

"Corporate politics sometimes gets in the way of a larger benefit," he said. ☐

Carmakers form VSAT net alliance

continued from page 15

The 75-year-old NADA examined a similar service being offered by Volkswagen of America, Inc.'s V-Crest Systems, Inc. subsidiary that uses VSATs and hubs provided by Scientific-Atlanta, Inc. But it decided to go with Hughes since GM and Chrysler are already installing Hughes VSATs at a total of 15,000 dealerships.

"This is the first time we've ever endorsed any vendor," Kelderman said. "We've created the potential for this shared network. It will evolve as other car manufacturers make the business decision to go to satellite communications. And we anticipate that by the turn of the century, most everyone will be into satellite communications."

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N.Y. rocked by AT&T outage

continued from page 1

30 minutes of the cable cut. But it took about five hours for network operations to be restored to all banks.

The cable cut also blocked 60% of all long-distance traffic carried by AT&T into and out of the five boroughs of New York, according to an AT&T spokesman. In addition, it caused major problems for large AT&T network customers such as General Electric Co.

"I would kill if someone from AT&T walked in here right now," said Stan Welland, GE's manager of corporate communications. "This is what I would qualify as a disastrous outage."

Welland said the cable cut knocked out network service for three GE business units and that at least 10 T-1s on GE's corporate backbone net were taken down.

Other firms affected included AMR Corp., Dow Jones & Company, Inc., Fundamental Brokers, Inc. and Home Box Office, Inc.

Cut in Newark

According to an AT&T spokesman, the cable cut occurred at 9:35 a.m. Friday in a manhole in downtown Newark, N.J.

By early afternoon, AT&T had only been able to reroute traffic from a couple of T-3s to other fa-

cilities, according to the spokesman. At press time, the company could not say when regular network operations would be restored.

Service on the cable was interrupted when AT&T employees pulling old fiber-optic cable from an underground conduit accidentally damaged splices on a new cable.

The cable cut interrupted computer operations at the Commodity Exchange, Inc. and forced the exchange to shut down for three hours. The New York Mercantile Exchange was closed at 10:30 a.m. and remained closed until mid-afternoon for the same reason.

Halted flights

All incoming and outgoing flights were halted at John F. Kennedy International Airport, La Guardia Airport and Newark International Airport until 11:20 a.m. because the cable cut disrupted operations on a Federal Aviation Administration network, called Tracon, according to a spokeswoman for the Port Authority of New York and New Jersey.

Lengthy flight delays continued after that time, as well.

Tracon is used to route naviga-

tional data from airplanes to air traffic controllers via a network of terrestrial facilities and radio towers that receive and transmit data to planes in the air.

At least two airline reservation networks were affected by the outage. American Airline, Inc.'s SABRE net lost connections to about 50 travel agencies while WORLDSPAN Travel Agency Information Services lost communications to more than 100 agencies in New York plus a few in neighboring states, according to representatives for those companies.

A spokesman for Dow Jones said the fiber cut halted communications over private circuits linking computers in London and Jersey City, N.J. As a result, he said, subscribers to the company's Telerate market information services in the U.S. were unable to obtain pricing data from Europe, and vice versa.

Hogan Lam, telecommunications operations manager at HBO in New York, said the fiber cut brought down a data network comprising mostly 19.2K bit/sec circuits used to shuttle administrative data to and from offices around the country. ■

Senior Editors Bob Brown, Jim Brown, Paul Desmond and Bob Wallace contributed to this story.

IS-IS protocol faces fight

continued from page 2

But a showdown between the standards is likely to come because the two protocols are incompatible and Internet users are seeking a common protocol. "The pressure for having a common protocol is great," Cerf said. "Users are suffering from not having [one]." He said the group may well opt for OSPF.

Many in the Internet community, having suffered the inadequacies of the older Routing Information Protocol (RIP) standard, are eager to see the Internet back OSPF in order to gain greater routing functionality and network security.

RIP-based routers are limited to 16 hops across the network and cannot determine the least expensive path between one network point to another. OSPF has overcome these limitations.

But OSPF is only useful for TCP/IP networks, while Integrated IS-IS allows users to build a network supporting both OSI and TCP/IP. The Internet community, however, may not be prepared to wait for Integrated IS-IS to be built into products.

David O'Leary, network operations manager at the Southern Universities' Research Association Network, a 100-site regional network on the Internet, said OSPF is available or in vendor beta tests, while Integrated IS-IS

has only seen minimal implementation. Analysts said OSPF also offers some benefits over Integrated IS-IS.

"OSPF and dual IS-IS are similar in that they both calculate a path to get from one node to another," said Eric Andrews, manager with Vienna, Va.-based Network Strategies, a network consulting practice of Ernst & Young. "The difference is OSPF can use several metrics to evaluate that path, and IS-IS only uses

now promised for 1991.

DEC, a strong backer of Integrated IS-IS, worked with the IETF's IS-to-IS Working Group to develop the specification.

"It's a significant blow to DEC if they shoot down Integrated IS-IS," Andrews said.

A DEC spokeswoman said the company could not comment on how it would respond to hypothetical situations, but she said DEC believes Integrated IS-IS is the best multivendor protocol.

The Internet community may not be prepared to wait for Integrated IS-IS to be built into products.



one metric to evaluate that path.

"OSPF is overall a more practical and sophisticated protocol for today's environment," Andrews added. "They call it the 'SIN' approach — ships in the night — which allows you to support multiple protocols side by side rather than convert to a single protocol."

Analysts said the outcome of the decision will have an impact on vendors, particularly Digital Equipment Corp., which last week said it would implement the Internet version of Integrated IS-IS in its long-awaited DECnet Phase V, expected in 1990 but

Router vendors such as Proteon, Inc. and Advanced Computer Communications, are backing OSPF as the next-generation TCP/IP standard ("Four vendors successfully test OSPF interoperability," *NW*, Dec. 24, 1990).

Cerf refuted the statement that a rejection of Integrated IS-IS would torpedo the implementation of dual-use IS-IS. "It would not spell the death knell of Integrated IS-IS," Cerf said, adding that both standards would probably be implemented by vendors.

Integrated "IS-IS is going to happen because we need to support OSI," Cerf said. ■

Execs to align telecom, tasks

continued from page 2

gundo, Calif., consulting, systems integration and facilities management firm.

For the second straight year, survey respondents ranked reshaping business practices through information technology as the top management issue.

Reshaping or reengineering business processes requires making changes to business practices, not just automating outdated practices, said Bob Reck, a vice-president at Index Group.

A couple of years ago, many companies tried unsuccessfully to clone information technology strategies used by the likes of American Airlines, Inc. and Otis Elevator, Inc. "to lock up customers," Reck said. Since then, companies have realized they do not have the market power to duplicate the success of American Airlines' SABRE network, but they can make changes to streamline internal operations used to support customers and suppliers.

Other high-ranking issues identified by the survey include aligning IS goals with those of the business (ranked second) and instituting computer systems and network applications that cross business-function boundaries (ranked third).

The reason instituting technology that crosses business functions ranked high, the study said, is because "speeding order management, accelerating research and development, marketing with precision and other corporate mandates require the close coordination of people across functional and geographic boundaries."

IS managers said they will ad-

dress these top issues within an environment of fiscal restraint. The study found that computer and communications technology budgets are expected to increase just 5.3% in 1991 over 1990, down from a projected increase of 6.9% for 1990 and a projected increase of 7.5% for 1989.

Survey respondents cited a sharp downturn in industry revenues and company income, the Mideast crisis, efficiencies gained from consolidating technology operations and bloated staffs as reasons for slashing or holding the line on IS spending.

"With information systems budgets getting squeezed, IS executives apparently believe their companies need to focus on computer applications that reengineer business processes closest to the customer," said James Champy, Index's chairman and chief executive officer.

Kerry Overlan, director of telecommunications at COM/Energy Services Co. in Cambridge agreed. "Most of the companies I know are absolutely concerned with tightening operations," he said. "We're all interested in anything that can minimize human resources through maximizing technology."

A major stumbling block for users trying to automate business tasks is that few senior managers comprehend the benefits of marrying information technology with business practices, according to survey respondents.

Some 40% of survey respondents said senior management does not understand the importance of reshaping business processes through information technology. Another 37% of IS managers said senior managers understand the issue, and 23% of respondents were neutral. ■

Videoconference users seek links

continued from page 4

pany videoconferencing about a year ago. "Benefits include immediate access to and transfer of information in a manner that is much more real time than calling the customer and saying, 'I'll fly down to your site next week to discuss the plans.'"

Virgil Palmer, manager of corporate telecommunications planning at Air Products and Chemicals, Inc. in Allentown, Pa., said his company was sold on using videoconferencing by Bechtel for a current project involving the two companies. Air Products will save about \$150,000 in travel and related expenses thanks to the videoconferencing hookup with Bechtel for project management, including the exchange of designs, he added.

Some users are looking forward to videoconferencing standards and the availability of high-speed switched services to simplify intercompany communi-

cations. Adoption of the standard would enable a company with PictureTel coder/decoders (codec), for example, to communicate with a user of CLI codecs almost instantaneously via switched digital links rather than via a gateway service that might need to be reserved hours or days in advance.

"The adoption of [the videoconferencing codec standard] Px64 will be big news," Hughes' Lacombe said. "It will allow communications with dissimilar systems. We can't expect all of our customers and business partners to be using the same equipment as us."

Even with the adoption of standards, obstacles to widespread adoption of intercompany videoconferencing remain, said Walter Miao, vice-president of technology at Link Resources Corp., a market research firm in New York.

Among the obstacles, according to Miao, is the \$30,000 to \$50,000 price tag that videoconferencing systems carry. ■

TRW uses Rhapsody

continued from page 2

orders for defense contracts valued at more than \$100,000. It will also help the group achieve its goal of establishing a completely paperless purchasing operation by the end of this year, Leland said.

"The decision to implement Rhapsody was made by the members of the purchasing department [in order] to streamline the purchasing process," Leland said. "It was a result of our total quality management and continuous process-improvement programs."

The groupware edge

Groupware is a client/server application that enables groups of employees to work together more efficiently. It supports a va-

One of Rhapsody's biggest advantages is that it will enable agents to access nearly 30 data bases on a variety of processors.

▲▲▲

riety of capabilities, including messaging, document-sharing functions and scheduling tools.

At TRW, Rhapsody will run on two Unix-based servers supporting 80 AT&T 80386 DOS-based personal computers on an Ethernet network. The groupware uses AT&T's desktop graphical user interface, which is based on Microsoft Corp.'s Microsoft Windows and Hewlett-Packard Co.'s NewWave object-oriented software.

One of Rhapsody's biggest advantages is that it will enable purchasing agents to access nearly 30 data bases on a variety of processors through windows on their workstation screens and download data needed to draw up requests for quotes, evaluate bids and develop specifications for the final purchase order.

The data bases contain information on such items as purchase orders, general purchasing and accounting, along with information on particular projects on which suppliers are qualified to bid.

Each data base, whether it is on a remote host or the local server, will be represented by a different icon on the menu. In addition, other applications, such as word processing, spreadsheets and facsimile, will be represented by an icon.

By clicking on these icons with a mouse, an agent can call up the appropriate application or data

base in one or more windows on the screen.

Currently, agents use dumb terminals to access data bases on a host computer. Each time they change data bases, they must log in and out, and if they want to copy a file, they must print it out and bring it back to their desk.

Other features

In addition, Rhapsody will guide agents through the purchasing process by providing prompts about work that needs to be completed according to a predefined schedule, Leland said. Currently, 116 steps are involved in producing a purchase order from a requisition form submitted by any of TRW's 6,000 employees.

TRW said its purchasing agents will also make heavy use of Rhapsody's integrated word processing, scanning and fax capabilities.

Many of the documents that must be included in a large purchase order under a defense contract are government forms that don't require much reworking.

With Rhapsody, agents will be able to download an electronic copy of a document, make the necessary changes and append it to the purchase order. Currently, agents either retype the document or cut and paste the parts that need to be changed, Leland said.

Rhapsody users will also be able to fax request for quotes and purchase orders to suppliers directly from their workstations, rather than sending them through the mail.

In addition, correspondence with suppliers, including responses to a request for proposal, which need to be included in a purchase order, can be scanned into the system and included in the electronic purchase order.

TRW declined to disclose its cost for the Rhapsody software. When AT&T announced Rhapsody last spring, it said client software would cost approximately \$8,500 per user for a 20-workstation system and each server package would cost about \$70,000. ■

Chapter 11 paves way

continued from page 6

ed Switching System (ISS) circuit/packet switches also located in the data center.

The data center is linked by 56K bit/sec fractional T-1 lines from MCI Communications Corp. to low-end #1-ISS Model 30 Netrix switches at 53 Revco stores scattered across 10 states. For purposes of redundancy, these stores are linked to at least two nearby stores with #1-ISS Model 30 switches via 56K bit/sec fractional T-1 links.

Revco's remaining 1,200 stores are linked into the backbone via local 56K bit/sec dedicated lines.

Insurance policy

Pharmacists at Revco stores use the network every time a customer orders a new prescription or refill. Clerks key the order into a personal computer that is either on-line to one of the large insurance companies that Revco deals with most often or linked to Revco's own data bases. The data bases are programmed to send a response back to the store employee indicating whether a prescription is covered by a particular insurer and by how much.

The on-line process takes about 10 seconds for a refill and 15 seconds for a new prescription, Brink said. Previously, a pharmacist would spend between one and three minutes performing less comprehensive checks with Revco's old computer systems, he said.

The time savings translate into more time for pharmacists to talk to customers, Brink said.

"A key benefit of the network is allowing a chain drugstore to present a local drug store image," he said.

Ironically, Revco might never have built the private packet net had the company not run into financial problems, Brink said.

Revco management concocted a \$1.25 billion leveraged buyout in the mid-1980s that saddled the company with heavy

debt and forced it to file for protection under Chapter 11. Currently, Revco is at the center of a widely publicized case about whether it will sue its ex-advisors and former shareholders that benefited from the buyout.

Not long before the company filed for Chapter 11, it began contemplating the move to a new network under new management, Brink said. At first, managers thought a private very small aperture terminal network would be the obvious choice given that so many large retailers, including rival drug chain Walgreen Co., have exploited VSAT nets to cut costs, improve customer service and gain a competitive edge.

"Our new management team included some people from Walgreen who had been involved in that company's decision to go with VSATs," Brink said. "There was a lot of pressure for us to go in that direction too."

But largely due to the fact that Revco was well on its way to Chapter 11, the company decided against installing a VSAT net because of its large up-front costs, Brink said. VSAT equipment would cost twice as much as the \$10 million that Revco spent on equipment for the terrestrial net, which consisted mostly of monthly network charges that could be dumped more easily than a VSAT net if need be.

As it turned out, Revco would have had plenty of capital to fund a VSAT net, Brink said. When Revco's new chief executive officer took the company into Chapter 11, he got the go-ahead from a federal judge to let the company take a large portion of its operating profit and roll it back into capital improvements that included remodeling the stores, as well as installing a new point-of-sale system and the new pharmacy net.

"The opportunity to do this network really came out of us going into Chapter 11," Brink said. "The company was still profitable. So as soon as we got protection from the debt, we found ourselves with all kinds of capital to do things that should have been done all through the '80s." ■

Users extend virtual nets

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from overusing the billing capability. He acknowledged that such a step could drive up costs and, therefore, keep users from adding employee homes to their nets.

Palmer said companies that add employee homes to their MCI Vnets are financially responsible for all charges, including fraudulent use of the service incurred by those accounts.

"I'm not entirely sure a corporation will want to be liable for somebody running up a huge phone bill and not paying it," Palmer said. "With hirings and firings, keeping track of who is and isn't authorized to use the network could become an administrative nightmare."

William Miller, corporate telecommunications director for Control Data Corp., a computer manufacturer in Minneapolis, said the disadvantages of adding employees' homes to virtual networks outweigh the benefits of the strategy.

"The cost of rebilling alone could wipe out savings realized by replacing employees' [existing] long-distance service with a virtual network service," he said. ■

NETWORK WORLD

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GAO says DDN is waste of money

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fense Department has never undergone an economic analysis to evaluate the effectiveness of the DDN.

After conducting its own analysis, the GAO found that the cost of using the DDN is between 39% and 558% higher than alternative communications services, such as the Federal Telecommunications System (FTS) 2000. The DDN's packet-switching technology is particularly costly and inefficient for high-volume data transfers, which could be better handled over dedicated lines or a connection-based service, the GAO report said.

The DDN has also been plagued by technical problems. At the end of 1989, users had asked the Defense Department to exempt 91 different computer systems from mandatory use of the DDN due to technical problems. Twenty-one of those waiver requests came from departments with systems using the synchronous terminal protocol, which is incompatible with the DDN.

Thirteen more waivers were granted because the DDN's 56K bit/sec transmission speed was inadequate for the volume of data handled by the users. In particular, the Defense Logistics Agency,

which recently consolidated 26 financial processing sites into six, and the U.S. Air Force, which collects and transmits high-volume scientific and graphical data, need T-1 speeds. Full T-1 capability will not be available on the DDN until 1993, the report said.

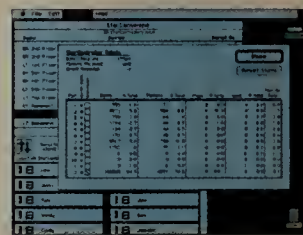
Due to the shortcomings brought out in its analysis, the GAO recommended that the Department of Defense reconsider its policy of mandatory DDN use. In the future, the GAO said, the agency must take cost into consideration, evaluate DDN use on a case-by-case basis and conduct an analysis on the impact that allowing some users to switch to less expensive FTS 2000 services would have on the DDN. ■

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